evoted to
TEXTILE
HEMISTRY
LEACHING
DYEING
PRINTING
INISHING

Y 6, 1946
UME 35, No. 9

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AMERICAN

DYESTUFF REPORTER

FICIAL PUBLICATION
of the
PROCEEDINGS
ERICAN ASSOCIATION
TEXTILE CHEMISTS
AND COLORISTS

Why "Solophenyl" Colors?

If your trade demands the fastest-to-light Direct colors you just can't afford not to use the *Solophenyl** series.

Developed by Geigy after years of study this series has demonstrated its superiority in many of the country's fussiest mills. The range of Solophenyl colors while entirely adequate is limited in number—limited because only the fastest-to-light Direct colors are privileged to carry the name *Solophenyl*.

The second printing of Color Card 318-D is now available.

* *Reg. U. S. Patent Office*

GEIGY COMPANY, INC.

89-91 BARCLAY STREET — NEW YORK — NEW YORK

Boston · Providence
Philadelphia · Charlotte
Toronto · Portland, Ore.

Geigy
Dyestuff Makers Since 1859

In Great Britain
The Geigy Co., Ltd.
National Buildings
Parsonage, Manchester

impart economical, effective WATER REPELLENCE with PARAMUL 115

PARAMUL** 115 is an aqueous emulsion of wax and aluminum salts that is now widely used by textile manufacturers to impart water repellency and stain resistance to fabrics. It is equally suitable for treating cotton, rayon, linen and wool fabrics for outer wear as well as equipment purposes. The resultant finish is odorless and harmless to skin or fabric.

Easy and economical to use, PARAMUL 115 is stable over a wide range of temperatures from freezing to tropical conditions. It is safely stored without breaking down over long periods of time.

Investigate PARAMUL 115 today and find out how this war-proved water repellent can serve your merchandise and customers. Our technical staff and research laboratories are at your disposal to help you achieve the best results in imparting water repellency and stain resistance to your fabrics.

AMERICAN CYANAMID & CHEMICAL CORPORATION
(A Unit of American Cyanamid Company)
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Among Cyanamid Products for the Textile Industry Are . . .

Penetrants • Softeners • Finishes • Sizing Compounds • DECERESOL* OT Wetting Agents
PARAMUL** 115 Water Repellent, and other Specialties and Heavy Chemicals.

*Reg. U. S. Pat. Off. **Trade-mark

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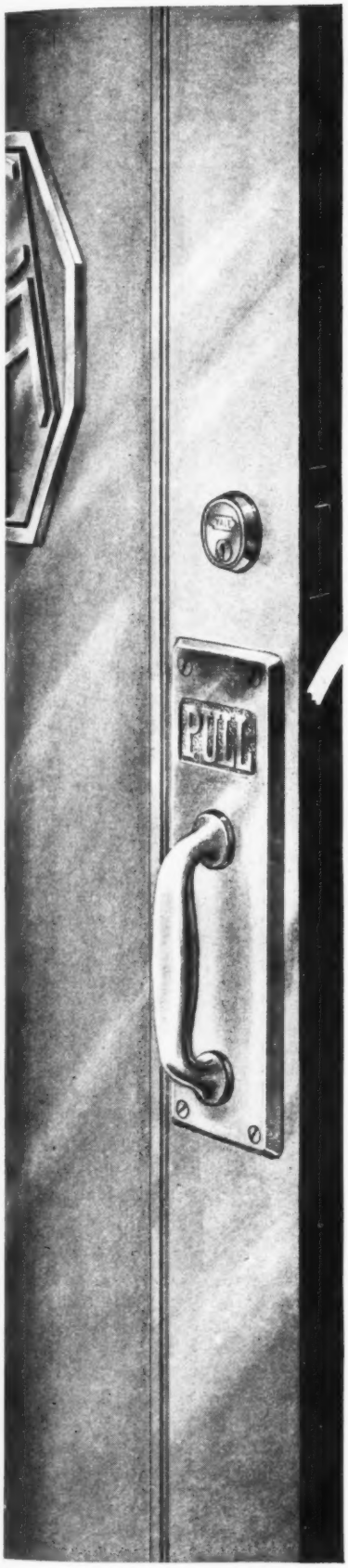

Announcing

COPRANTINES

A NEW RANGE OF COLORS
WITH BOTH
WASH AND LIGHT FASTNESS

For direct dyeing rayon and cotton
to *extra* fastness requirements.

DYESTUFFS • CHEMICALS • INTERMEDIATES

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VAT DYES OF THE DOW CHEMICAL COMPANY

Here are just 3 of the many advantages!

It would take several pages to list *all* of the advantages Orvus offers in textile processing. But here are a few of the many important ones you can count on with this efficient sulfated fatty alcohol type detergent:

1 FAST, THOROUGH WETTING, EMULSIFYING AND SCOURING ACTION

Orvus promotes more uniform and thorough dyeing. Helps prevent undesirable odor and yellowing of goods in storage.

2 HIGH RESISTANCE TO HARD WATER

Orvus helps guard against scum, streaks, specks and spots from hard water deposits. Effective also in the presence of acids and alkalis.

3 SAFETY TO FIBER, FABRIC AND COLOR

Orvus does a bang-up job in scouring fugitive colors. It eliminates alkalinity... minimizes bleeding... leaves white backgrounds clear... keeps colors bright.

PROCTER & GAMBLE U.S.A.
ORVUS
D PASTE

Procter & Gamble

Orvus-D is the new name for a product widely used for many years in the textile field. It is time-tested, time-proved. The name of its makers is your guarantee of its excellent processing results.

ORVUS-D*

Always a SAFE bet in textile processing!

* "Orvus" is the trade mark used by Procter & Gamble to identify one of its hymotal products.

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For clarity — sharpness — full-bodied colors, your printing pastes need KELTEX to give them exactly the right viscosity. Its high water absorbency reduces required non-dyeing solids to a minimum. KELTEX produces full color values. Its purity assures you of freedom from dirt, grit, cellulose and other foreign matter. KELTEX stops color migration. Greater speed of operations becomes practical — with safety and uniformity.
You never have to make variations in your formula because of KELTEX. This refined natural algin product is manufactured to precise standards. It is always uniform . . . easy to use . . . and decidedly economical. Change to KELTEX and benefit from its superior results. Or give KELTEX a trial with the personal assistance of our Technical Staff — without incurring obligation.
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KELCO COMPANY

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When There is a Choice—
Will You Be Chosen?

With the present scarcity, textile buyers can't be too selective. But when supply catches up with demand, where will you stand? One way of insuring your place among the chosen, is by continuing *now* to maintain quality in the textiles you produce. And in spite of scarcities, where quality depends on chemicals, you can obtain this insurance by using Hooker Chemicals. Dye and Textile Chemists who have been using Hooker Chemicals may have been handicapped by not being able to secure all the chemicals they wanted, but they were never handicapped by "poor quality" chemicals.

Listed below are some of the Hooker Chemicals that are being used in the dye and textile fields. If you haven't tried Hooker Chemicals yet, now is a good time to see how these quality Chemicals can make it easier for you to keep your quality up. Technical Data Sheets and samples are available when requested on your letterhead.

PRODUCT (Chemical Formula Molecular Weight)	HOOKER SPECIFICATIONS	SUGGESTED USES
Aluminum Chloride, Anhydrous $AlCl_3$; 133.3	Aluminum Chloride, min. 98.5%. Iron, max. 0.05%. Non-sublimables in air at 950°C max 1.5%.	Catalyst in synthesis of dyestuffs and intermediates.
Antimony Trichloride, Anhydrous $SbCl_3$; 228.1	Antimony Trichloride min. 99%. Iron and Arsenic, max. 1%. Lead, 0%.	Catalyst in organic synthesis; mordant in textile printing. Moisture and fire-proofing textiles.
Benzoic Acid—USP and Tech. C_6H_5COOH; 122.1	Benzoic Acid, min. 99.5%. Water, max. 0.2%.	Manufacture of dyes. Mordant.
Chlorparaffin Resin 70 $C_{24}H_{29}Cl_{21}$; 1063	Chlorine, min. 68 to 72%. Free HCl, max. 0.05%. Iron, max. 0.01%. Softening range 90° to 100°C. A brittle resin, soluble in aromatic solvents, difficultly soluble in mineral spirits.	Treating textiles to make water, fire, and mildew-proof.
Cyclohexanol (Hexahydrophenol) $C_6H_{11}OH$; 100.1	Cyclohexanol (High Grade) min. 98%. Distillation range 100%. 158° to 162°C.	Solvent for dyes. Chemical intermediate.
Ferric Chloride Solution $FeCl_3$; 162.2	$FeCl_3$ 40 to 42%. $FeCl_2$ max. 0.20%. Sp. Gr. 1.44 ± .01	Mordant in dyeing and printing textiles as oxidizing agent in making dyes.

PRODUCT (Chemical Formula Molecular Weight)	HOOKER SPECIFICATIONS	SUGGESTED USES
Lauryl Pyridinium Chloride C_5H_5N ($C_{12.6}H_{26.2}$) Cl; 292.0	Mottled tan, semi-solid. Solubility in water is 60 gms. per 100 gms. of water. Alkyl Pyridinium Chloride (Calc. as C_{12}) - min. 85.0%.	Cationic detergent. Wetting and cleaning agent for textile fibers. As a leveling agent and color modifier in dyeing.
Phosgene (Carbonyl Chloride) $COCl_2$; 98.9)	Colorless gas at ordinary temperatures. Does not discolor a 0.1% solution of KI when vigorously bubbled through solution for one minute. (Test for free chlorine).	Dye intermediate; chlorinating agent.
Sodium Sulfhydrate, Flake NaSH; 56.1	NaSH 70 to 72%. Na_2S 1 to 2%. NaCl, max. 1%. Na_2SO_3, $NaHCO_3$, max. 1%. Fe, max. 5 ppm. Cu, Ni, Cr, Mn, Pb, max. 1 ppm. Water of crystallization 28 to 26%.	Penetrating nitrocellulose; desulfurizing viscose rayon; calico printing; in sulfur dye baths.
Sodium Sulfide, Flake Na_2S; 78.1	Na_2S 60 to 62%. NaCl, max. 1.5%. Other Na Salts, max. 2.0% Fe, max. 8 ppm. Cu, Ni, Cr, Mn, Pb, max. 1 ppm. Water of crystallization 36.5 to 34.5%.	Desulfurizing viscose rayon; calico printing; in sulfur dye baths.

ARMY NAVY E

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New York, N. Y. • Wilmington, Calif. • Tacoma, Wash.

HOOKER CHEMICALS

8413

Chlorine **Caustic Soda** **Muriatic Acid** **Ferric Chloride** **Paradichlorbenzene**

Powerful

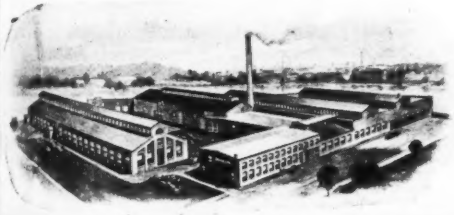
IS THE WORD FOR

SULFRAMINE DT*

Ultra's amazing new POWDER detergent

Leading textile mills are finding Sulframine DT an exceptionally efficient and economical detergent. Chemically classified as an alkylaminosulphate, it can be utilized in almost every phase of boiling off and dyeing. As an emulsifier and foaming agent, Sulframine DT dissolves readily, and it will form rich suds even in dilutions of one to ten thousand or more parts of water. Not even the most severe water conditions can affect its phenomenal properties.

Sulframine DT is totally immune to lime and magnesium salts . . . resistant to acids and alkalies . . . and will not deteriorate in storage. In fact, it can replace soap, eliminating the dangers of rancidity and stains left by unrinsed soap particles. Too, the thorough dispersing qualities of Sulframine DT make it an ideal dyeing assistant for rayon and acetate fabrics. Let a test prove your need for Sulframine DT. One of our technicians will be glad to bring you a practical mill run sample.



NOTE: Sulframine DT has potent commercial uses in dozens of other industries: Dry Cleaning, Dairy, Steel, Insecticide, Cosmetics, and Household Preparations. Wire or write—today—for more detailed information.

ULTRA CHEMICAL WORKS

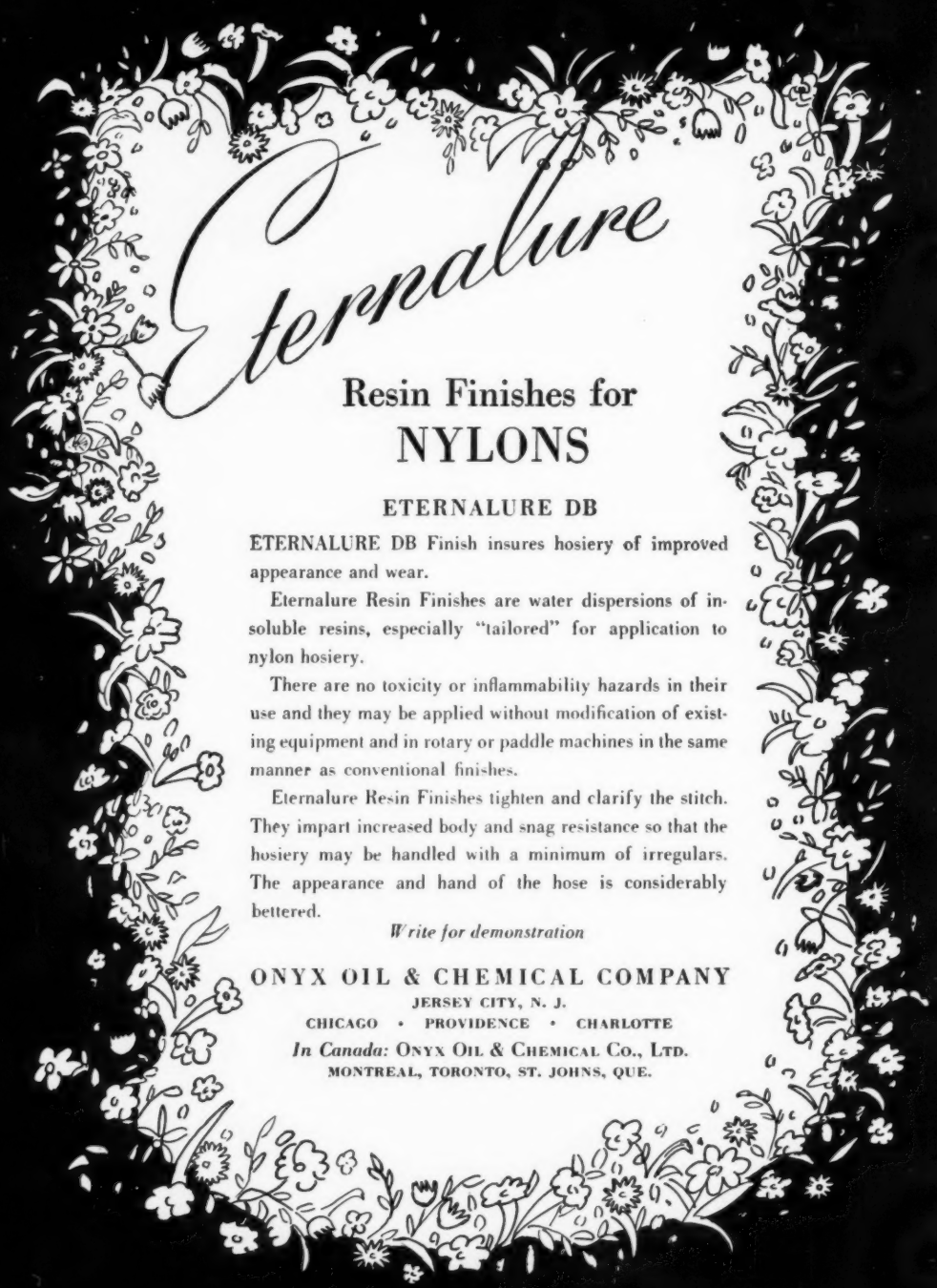
INCORPORATED

Paterson, N. J. Chicago, Ill.

OTHER ULTRA CHEMICAL PRODUCT DEVELOPMENTS . . . ULTRAMINE • DETERGOL • SULFRAMINE DT PASTE
SULFRAMINE DR PASTE • SULFRAMINE POWDER • ALBUTEX • ALBUTINE • DERMASOL • ULTRA GLOSS B • DULLITE T

*Sulframine DT is made from an exclusive formula—U. S. Pat. Pending SULFRAMINE DT—REG. U. S. PAT. OFF.

ONYX



Resin Finishes for NYLONS

ETERNALURE DB

ETERNALURE DB Finish insures hosiery of improved appearance and wear.

Eternalure Resin Finishes are water dispersions of insoluble resins, especially "tailored" for application to nylon hosiery.

There are no toxicity or inflammability hazards in their use and they may be applied without modification of existing equipment and in rotary or paddle machines in the same manner as conventional finishes.

Eternalure Resin Finishes tighten and clarify the stitch. They impart increased body and snag resistance so that the hosiery may be handled with a minimum of irregulars. The appearance and hand of the hose is considerably bettered.

Write for demonstration

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MONTREAL, TORONTO, ST. JOHNS, QUE.

onyx

GENERAL DYESTUFF CORPORATION

NEW YORK

"But, darling, you never give me nylons scoured with Alkamine K-50."

Alkamine K-50, a powerful new detergent for scouring nylon, rayon and rayon welt hosiery, gets to the center of the fiber with amazing speed. Fabrics are cleaner and clearer in half the ordinary time.

Equally effective on cotton skeins and package yarns, and cotton piece goods combined with spun rayon, Alkamine K-50 increases dye penetration and shortens dyeing time. Results are more uniform because there are no lime soap deposits to cause streakiness. Fabrics emerge with a fresh, lustrous finish.

If you have a problem in scouring and wetting-out, try the new and improved Alkamine K-50 in paste form. We'll be glad to serve you.

ALKAMINE K-50

Amalgamated Chemical Corp., Phila. 34, Pa. :: Southern Representative: Robert A. Bruce, P. O. Box 35, Greensboro, N. C. : : Makers of a complete line of Textile Finishes, Dyeing Agents, Penetrants and Softeners.

Protect acetate colors from Gas and Fume Fading

VELVAMINE GF

Produces a soft mellow finish!

Velvamine GF is a blend of amines and softeners designed to protect acetate colors from gas or fume fading. It resists removal by drycleaning and, when used on mixed fabrics, has a minimum effect on the shade and light fastness of the direct colors

Velvamine GF produces a soft, full hand and does not affect the appearance of the treated fabrics.

Velvamine GF is compatible with resins, gelatine, glue, starches, dullers and similar finishing compounds.

REFINED PRODUCTS COMPANY
Lyndhurst • New Jersey

***Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent**

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New England Representatives: E. L. LEGG, P. O. Box 597, Providence, R. I.
CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16) R. I.

Canadian Selling Agents: Berkeley Products Canada, Ltd., 41 Hillcrest Avenue, St. Catharines, Ontario, Canada
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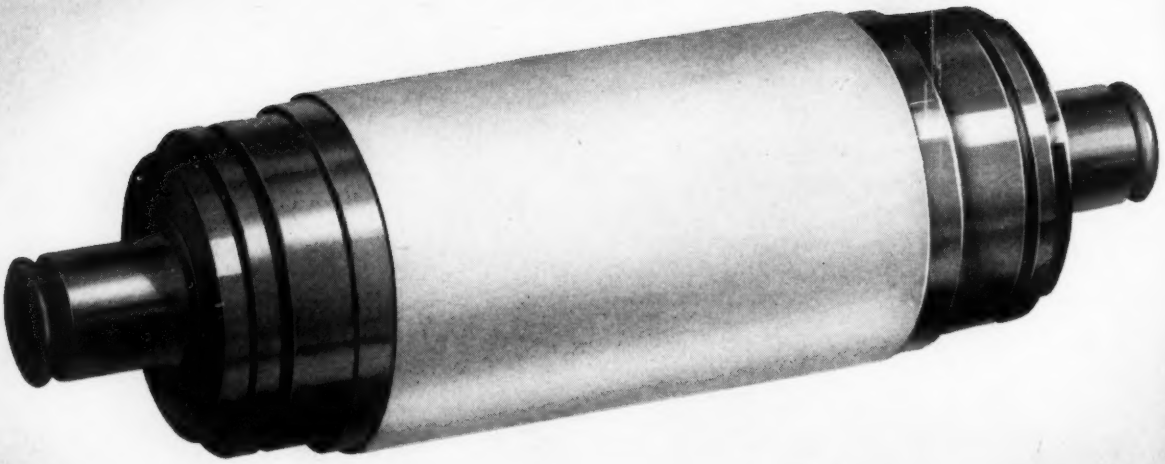

Perkins Calender Rolls are the natural result of the longest and broadest experience in this highly specialized industry.

B.F. PERKINS & SON, INC.

ENGINEERS AND MANUFACTURERS

HOLYOKE, MASSACHUSETTS

They Belong in Good Company

Ahcovel-E and **Ahcovel-F** (substantive softeners for cotton, rayon, acetate, linen and nylon) "belong in good company". Being alkaline, they may be used with gas inhibitors and also fast-to-light colors to preserve maximum fastness.

THEY BOTH HAVE THESE ADDITIONAL PROPERTIES

1. Provide a velvety soft finish.
2. Do not affect shades of dyed fabrics.
3. Resistant to repeated washing and dry cleansing.
4. White paste products, producing a non-greasy, odorless finish, which will not discolor, or develop odor with heat, age or light.
5. Easy to apply; economical to use.

AHCOVEL-E

—was originally developed for hard twisted fabrics where good draping qualities are normally difficult to obtain—such as hard twist acetates and nylons. It flexibilizes the fibres.

Data sheets on request.

*Trade Mark Reg. Patented.

ARNOLD, HOFFMAN & CO., INC.

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ESTABLISHED 1815 • PLANTS AT DIGHTON, MASS. & CHARLOTTE, N. C.

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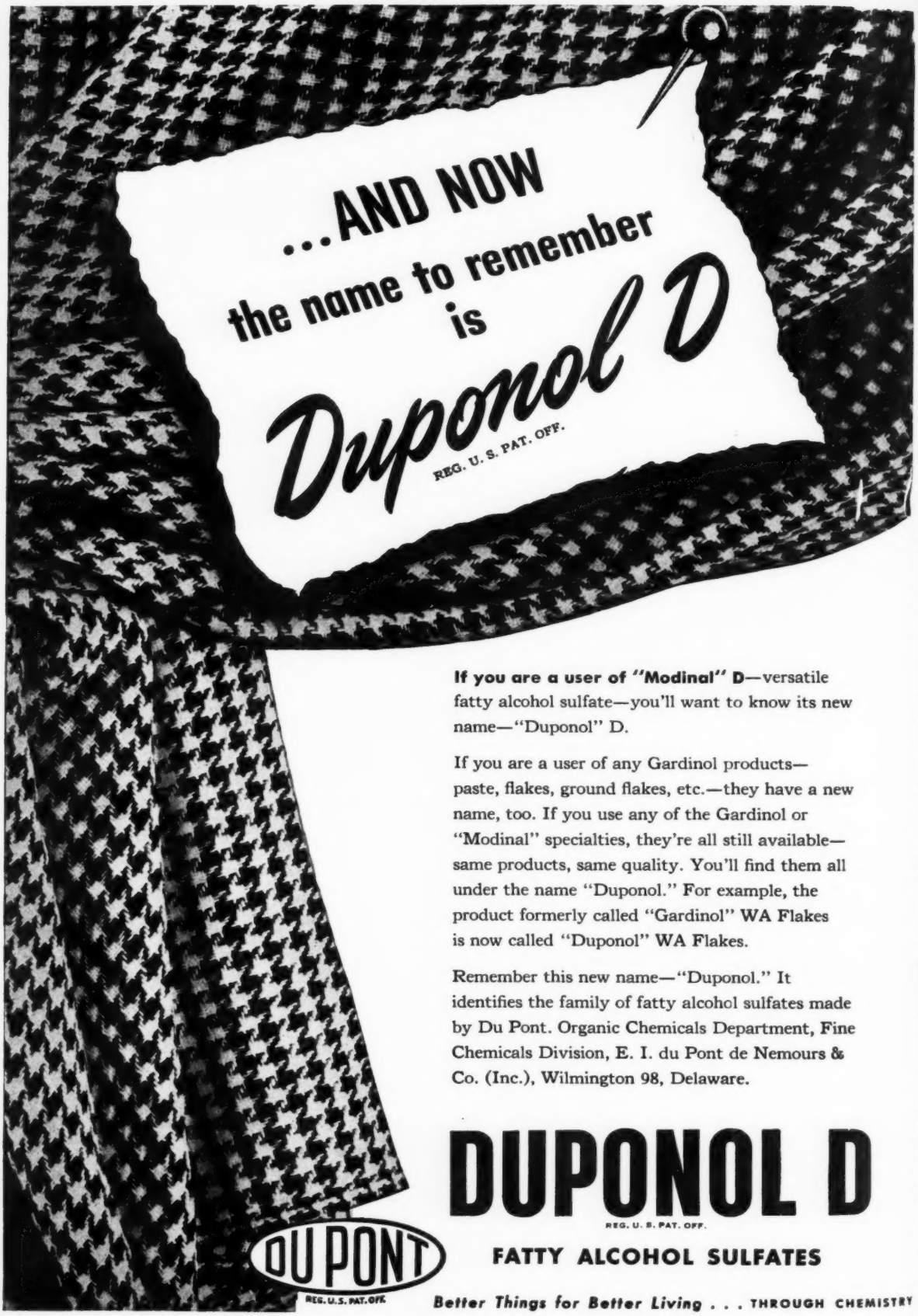
NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE



If you are a user of "Modinal" D—versatile fatty alcohol sulfate—you'll want to know its new name—"Duponol" D.

If you are a user of any Gardinol products—paste, flakes, ground flakes, etc.—they have a new name, too. If you use any of the Gardinol or "Modinal" specialties, they're all still available—same products, same quality. You'll find them all under the name "Duponol." For example, the product formerly called "Gardinol" WA Flakes is now called "Duponol" WA Flakes.

Remember this new name—"Duponol." It identifies the family of fatty alcohol sulfates made by Du Pont. Organic Chemicals Department, Fine Chemicals Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

DUPONOL D

REG. U. S. PAT. OFF.

FATTY ALCOHOL SULFATES

DU PONT

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Better Things for Better Living . . . THROUGH CHEMISTRY

EASTMAN FAST YELLOW 4RLF

For Dyeing Acetate Rayon

EASTMAN FAST YELLOW 4RLF dyes cellulose acetate rayon bright golden shades of yellow with exceptional fastness to sunlight. In pastel shades, twenty-five to forty hour light fastness is obtained; and, of the light-fast acetate yellows, this dyestuff is one of the fastest with respect to washing. Eastman Fast Yellow 4RLF also has high resistance to sublimation and perspiration.

Eastman Fast Yellow 4RLF dyes over temperatures ranging from 160°F to 190°F. Since it leaves cotton and viscose rayon white, it is suitable for cross-dyeing. This dyestuff is highly recommended for the dyeing of drapery and other fabrics which require extreme fastness to light and atmospheric-fume fading.

Eastman Acetate Dyestuffs are available in a wide variety of colors for the dyeing of cellulose acetate rayon. Additional information on these dyestuffs and their application to synthetic fibers and fabrics may be obtained by writing to TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.

Eastman

ACETATE DYESTUFFS

Lesem Bach's "Monte Cristo" Adventures with "Crown" Tested!

In its brief, colorful lifetime, fabulous "Monte Cristo" has ventured with astonishing success into many fields... men's suits and sportswear, the misses' market, too... and more enterprises are planned. Almost from the start, its faithful companion has been the CROWN Tested Plan.

"Monte Cristo's" Travels Begin...

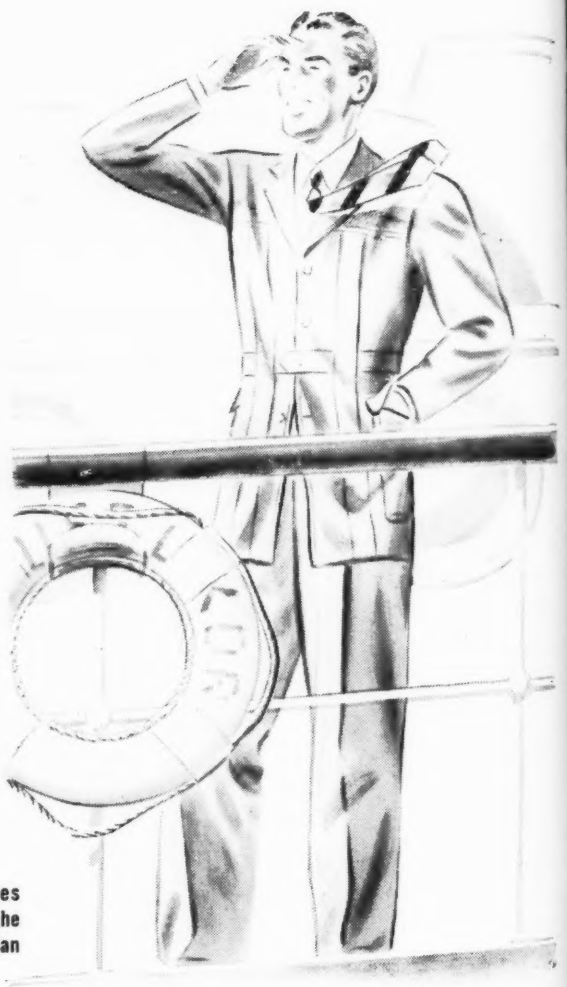
They begin, as most successful textile undertakings do, with an excellent dyeing and finishing job. Back from the F. P. Maupai Dyeing Co., Inc. came this 80% viscose spun rayon—20% wool fabric, in a glowing range of solid colors. It was ready for its jaunt to market now, but for one thing... advance assurance of a successful journey.

A Meeting with CROWN Tested

"Monte Cristo" and CROWN Tested saw eye to eye instantly, on the following points: Dry cleaning... perspiration... crocking... atmospheric fading... dimensional restorability... permanence of finish. "Monte Cristo's" seam slippage and tensile strength, too, were better than required. CROWN Tested's Red tag was only too happy to join Lesem Bach's new fabric on its way!

Is Your Fabric Going Places?

The CROWN Tested Plan is the most dependable means to assure it a full, exciting future. Why not investigate its advantages today?



No. 68 of a series from our files on the CROWN* Tested Plan

*Reg. U. S. Pat. Off.

NEW INFORMATIVE LABELING—CONSUMER SATISFACTION

Under the three tag system...

RED DISC for fabrics that can be dry cleaned only

GREEN DISC for washable fabrics

AMBER DISC for hand washable fabrics

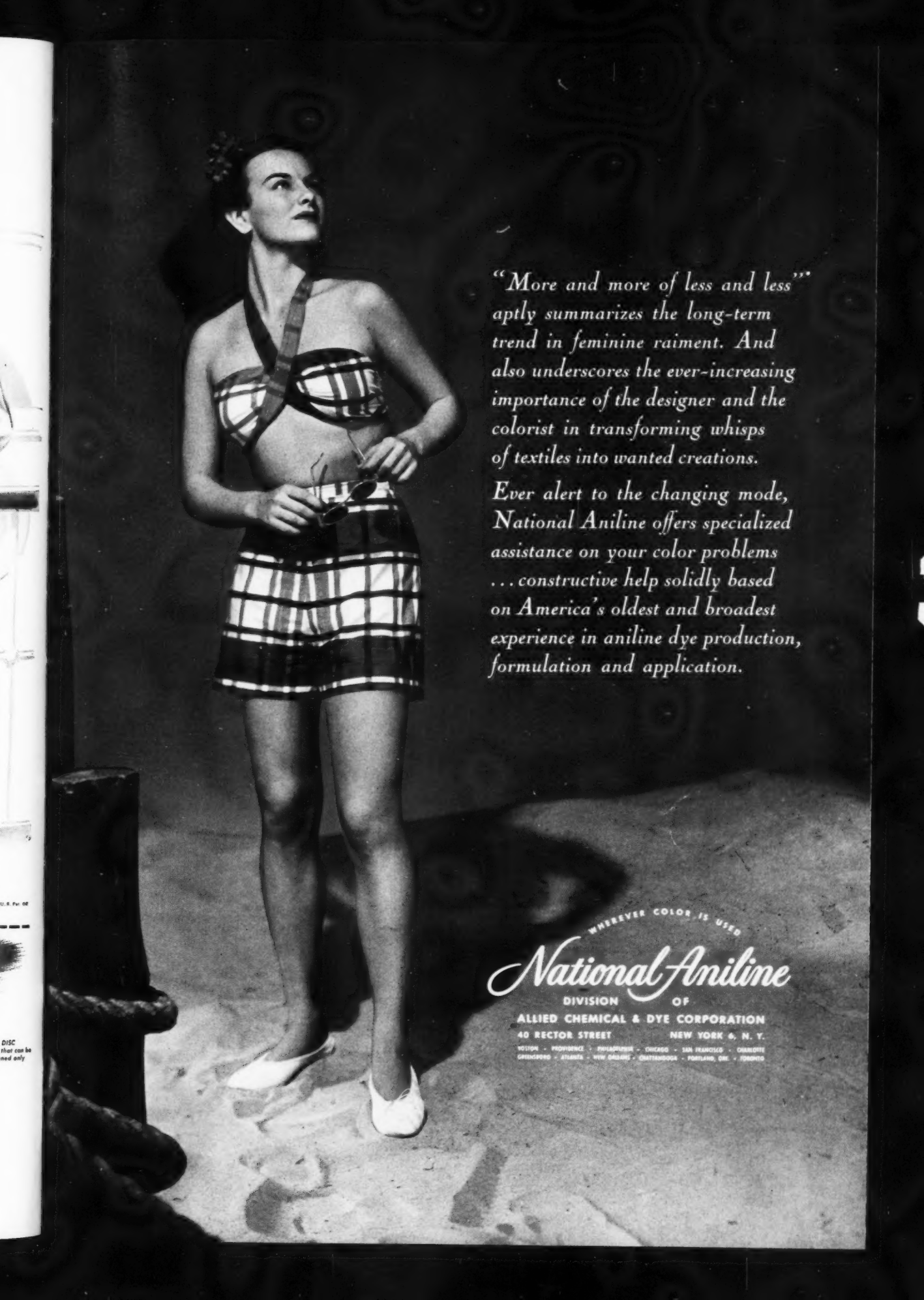
"Crown" Tested Rayon Fabric

A better way to buy rayon fabrics—This identification is awarded only to fabrics containing CROWN Rayon, after they have passed the CROWN Tests for serviceability. Samples of every dye lot of fabric have been tested against minimum requirements set and maintained by

AMERICAN VISCOSE CORPORATION

America's largest producer of rayon

Offices: 350 Fifth Avenue, New York 1, Charlotte, Cleveland, Philadelphia, Providence, Washington, Wilmington


"More and more of less and less"
aptly summarizes the long-term
trend in feminine raiment. And
also underscores the ever-increasing
importance of the designer and the
colorist in transforming whisps
of textiles into wanted creations.
Ever alert to the changing mode,
National Aniline offers specialized
assistance on your color problems
... constructive help solidly based
on America's oldest and broadest
experience in aniline dye production,
formulation and application.
WHEREVER COLOR IS USED
National Aniline
DIVISION OF
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET NEW YORK 6, N. Y.

May 6

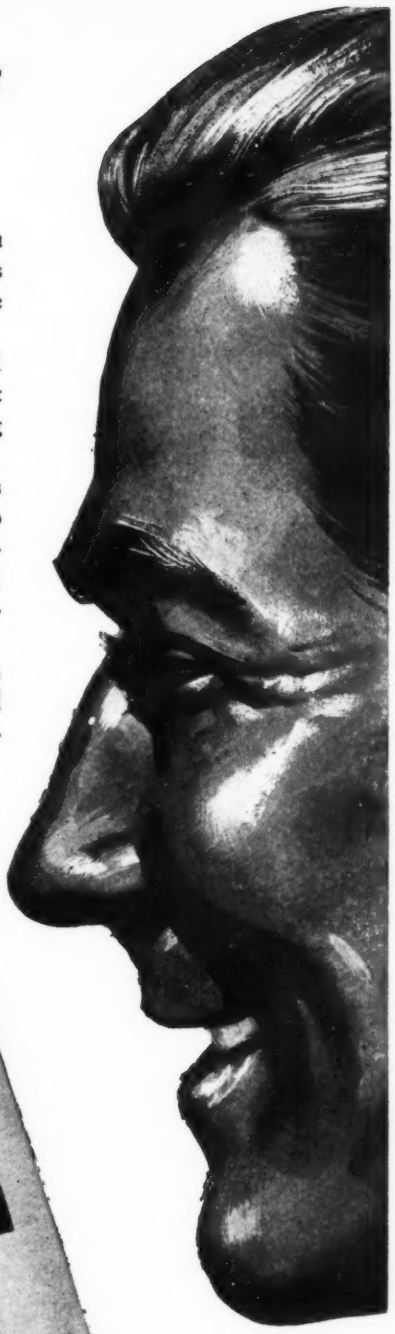
To help increase "Take-Home Savings"

THE Treasury Department has published two new booklets to help you and your employees realize the utmost benefit from your Payroll Savings Plan—benefits proportioned to the extent your employees add to "take home savings" by buying and holding U. S. Savings Bonds.

"Peacetime Payroll Savings Plan" for key executives offers helpful suggestions on the conduct of the Payroll Savings Plan. In addition, it quotes leaders of Industry and Labor and their reasons for supporting the Plan.

"This Time It's For You" is for distribution to employees. It explains graphically how this convenient, easy thrift habit works. It suggest goals to save for and how much to set aside regularly in order to attain their objectives. If you have not received these two booklets, or desire additional quantities, communicate with your State Director of the Treasury Department's Savings Bond Division.

See your Payroll Savings Plan through to maintain your share in America's future. It is sound economics and a powerful force for good today—and tomorrow—as a safeguard for stability and a reserve of future purchasing power—money that is kept within your community.



The Treasury Department acknowledges with appreciation the publication of this message by

AMERICAN DYESTUFF REPORTER

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and Advertising Council

Indigosols

for Pink Shades of Good Fastness

INDIGOSOL Pink IR EXT, and
INDIGOSOL Scarlet HB

are two products in this soluble vat color group which are unexcelled for the production of pink shades of good fastness. They are unequalled, in the fast color group, for ease of application, clearness of tone and the solidity of color in any depth. They can be printed, padded, or dyed on any textile fibre.

All INDIGOSOLS are readily soluble, easily developed and economical to use.

Pharmasols

for Bright Reds and Scarlets

PHARMASOL Scarlet RR Conc.
PHARMASOL Scarlet SNN
PHARMASOL Red GNBS
PHARMASOL Red RN and
PHARMASOL Red GNN

are the outstanding members of the group of azoic colors producing full and bright Reds and Scarlets of excellent fastness at a low cost.

PHARMASOLS are stabilized solutions, adjusted to the most practical concentration, which can be easily applied with a maximum of efficiency. As they do not decompose they overcome the problem of troublesome dissolving.

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451-453 Washington Street, New York City

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PROVIDENCE HAMILTON, ONT.
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IMPORTERS OF THE MANUFACTURES OF
DURAND & HUGUENIN S. A.
BASLE, SWITZERLAND

EXCLUSIVE DISTRIBUTORS OF
PHARMASOLS
PHARMOLS
PHARMACINES

Representative: Los Angeles (Hathaway Allied Products)

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AND CONVERTER

MAY 6, 1946

VOLUME 35 NUMBER 9

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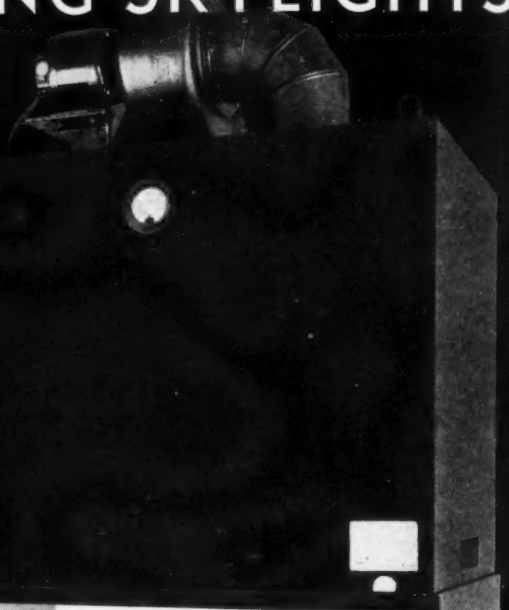

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DYESTUFF REPORTER

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A Dye Staining Technique for Studying SHRINKAGE CONTROL Imparted to Cotton by Melamine Resins*

J. K. DIXON, N. T. WOODBERRY and E. A. SCHUMAN

INTRODUCTION

CERTAIN melamine-formaldehyde resins are finding numerous applications in the field of textiles. The methylated methylol melamines have a desirable action in shrinkage control of wool[1] and cellulosic materials[2]. In connection with the application of these resins to cotton in the mill, it seemed desirable to have a rapid method of determining the extent to which these resins control shrinkage of cotton, in order to supplement the more reliable but more lengthy measurements of shrinkage. The method developed has proven satisfactory and some possible practical mill applications are discussed.

It is known that the application of melamine-formaldehyde resins to cotton will inhibit or reduce the tendency of direct dyestuffs to penetrate the cellulose. There are descriptions in the literature[3–7] of methods involving the use of dye-staining techniques in the study of fibers and of resin applications on textiles which indicated that these might be applicable in the present study. It seemed likely that there might be some correlation between the shrinkage control caused by methylated methylol melamine resins, under different conditions of resin cure, and other application variables, and direct dyestuff pickup.

EXPERIMENTAL METHOD

The application studies reported herein were made chiefly on 80 x 80 cotton cloth. A few preliminary results were also obtained on rayon. The cloth had been desized, washed and framed to size prior to application work.

A number of tests were made to ascertain the most suitable procedure for dyeing resin-impregnated fabric. Although other dyestuffs may be used it was found that Calcodur Blue SL (Pr 71) was satisfactory for this work. The ratio of the weight of dyebath to fabric was of the order of 300:1 in order to avoid appreciable exhaustion of the dyebath. Pieces 1½" square were taken from a large section of cloth and immersed in 500 cc. of dyebath containing 0.125% NaCl and 0.25% dyestuff. The cloth was dyed for twenty minutes at the boil. The time of dyeing and the concentration of salt and dyestuff were varied without any appreciable effect on the results.

After dyeing, the samples were rinsed three times in distilled water and dried in air and the percentage of dyestuff in the fabric was determined by reflectance measurements on a General Electric Recording Spectrophotometer[8a,b,c]. Typical reflectance curves are shown in Figure 1. A logarithmic function of the reflectance is plotted as ordinate against a linear wave length scale as abscissa. The literature[9] indicates how the reflectance in percent may be converted into strength of dyestuff on the fabric. By means of the "strength scale" which is plotted at the reflectance minimum, measure of relative dyestuff strengths for the reflectance curves may be obtained.

A sample containing no resin was always dyed along with the resin-treated samples. The percent reflectance curve for the sample without resin was found to be the same in each test and thus the reflectance not only served as a check on the dyeing procedure, but was used as the base-line for the calculation of the relative dye strengths of the resin-treated samples. The strength measurements were made in the band minima at 600*mu*. Visual estimations of the dye strengths may be made by comparing the test sample with a set of dyed Aerotex Resin M-3 treated standards when a spectrophotometer is not available or where a rapid qualitative evaluation is desired.

The methylated methylol melamine resin employed in this work was prepared in this laboratory and analyzed for degree of methylation and ratio of number of mols of formaldehyde to melamine. In order to simplify the description of these resin samples we will use the designation Aerotex Resin M-3 to indicate a trimethylol melamine with approximately 3 mols of methylation per mol of melamine.

Samples of cotton cloth were impregnated by immersing in a resin solution of suitable concentration and then squeezing out excess resin solution between rolls adjusted to give approximately 100% pickup. Samples were then cured under specified conditions of temperature and time, after which they were washed. The latter procedure consisted of washing in 12 liters of solution containing 30 g. of soap and 30 g. of soda ash at 160° F. During washing the temperature dropped to 130° F. and the samples were then rinsed at 160° F. This washing procedure is essentially the A.A.T.C.C. method No. 3, but employing a reciprocating stirrer. The percentage of resin in the cloth was determined by nitrogen analysis and by weight retention methods after the cure and after washing.

REPRODUCIBILITY OF THE DYE TEST

Duplicate samples of cloth were treated with resin, cured, and then dyed as indicated above. Similar tests were conducted on samples which were washed before being dyed. The reproducibility of the results under these conditions is shown in Table I. The agreement between results marked Experiment 1 and 2 was reasonably good except in a few instances. There appeared to be differ-

* Contribution of the American Cyanamid Company, Stamford Laboratories, 1937 West Main Street, Stamford, Conn.

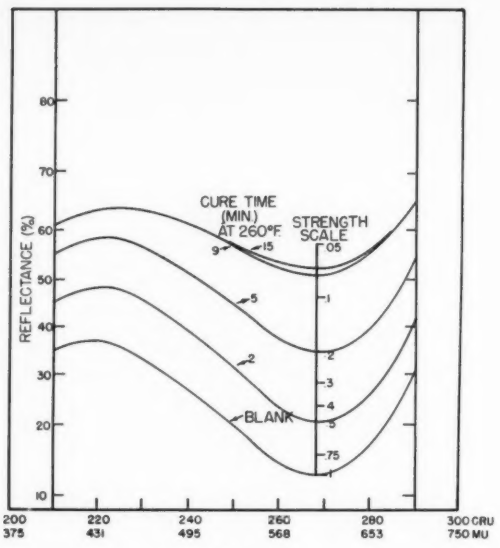

Figure 1

Typical Reflectance Curves of Calcodur Blue SL Dyed 80 x 80 Cotton Percale Test Samples. 8% Aerotex Resin M-3 Initially Applied. Samples Dyed 20 Min. at Boil in Bath Containing 0.025% Dye and 0.125% NaCl.

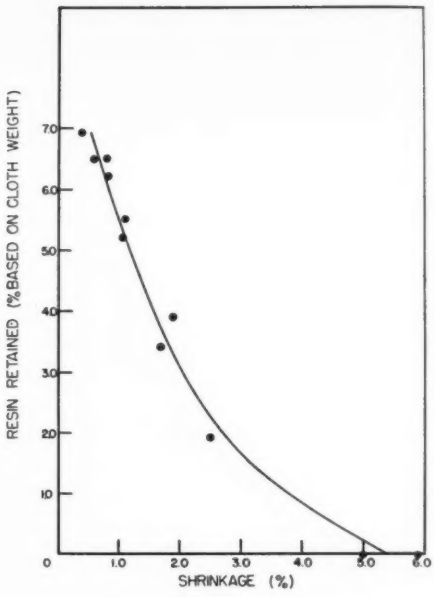

Figure 2

Effect of Drying and Curing Temperatures and Times on Resin Retention and Shrinkage Control. 8% Aerotex Resin M-3 Initially Applied.

ences between one side of the cloth and the other which were subsequently traced to slightly different curing conditions due to unequal temperature distribution in the curing oven.

RESULTS OF APPLICATION STUDIES ON COTTON

Several series of specially prepared resin-treated cotton samples were prepared. Table II tabulates these series. In most cases the shrinkage control, dye pickup and resin retention on washing were determined.

The results on the relation of shrinkage control to the percentage by weight resin on cloths cured for different times and temperatures and at a constant initial resin pickup of 8% (Expt 1,2,3) are summarized in Table III and are shown in Figure 2. Although there is some scattering of the points, it is obvious that the resin retained on washing can be correlated with the shrinkage for 8% initially applied over a wide practical range of curing time and temperature.

If one uses the data on dye concentration as determined by reflectance and resin retained for similarly treated samples, one obtains the results shown in Figure 3. Since the resin retention is a coordinate common to both Figures 2 and 3, these curves may be combined to give the dye strength by reflectance vs. shrinkage plot as shown in Figure 5, Curve A.

Upon dyeing cloth samples which had been treated initially with varying amounts of resin and all cured under the same conditions of 6 minutes at 290° F., (Expt. 4), the dye pickup was found to vary with the resin retained according to the curve shown in Figure 4. This indicated that a sample treated with as little as 2% resin might give a shrinkage as low as a sample retaining 3-4% resin after an initial application of 8%, which had been improperly cured. Actual shrinkage measurements showed this to be true. The dye-shrinkage relationship was studied directly. This was done on samples which were treated with

TABLE I

Dye Test Results for 80 x 80 Cotton Treated with 8% Aerotex Resin M-3 Cured at 290° F. for Various Periods of Time

Cloth Sample Number	Drying and Curing Time min.	% Resin on Cloth* after Cure	after Washing	% Dye Strength on Cloths Using Blank as 100% Experiment 1 One Side of Cloth	Other	Experiment 2 One Side of Cloth	The Other
741	2	7.3	—	5.5	6.2	6.4	7.1
742	2	7.5	5.3	7.2	10.3	—	—
726	3	7.2	—	7.5	6.7	9.5	8.5
734	3	7.5	5.6	6.4	5.8	—	—
727	4	7.4	—	3.9	3.5	4.7	4.7
735	4	7.2	5.5	4.3	4.0	—	—
728	5	7.2	—	2.4	2.6	2.5	2.9
736	5	7.1	5.3	5.8	5.8	—	—
729	6	6.9	—	2.3	2.7	2.4	2.9
737	6	7.2	5.4	3.5	4.8	—	—

* Percentage based on cloth weight as determined gravimetrically, is used throughout this paper.

TABLE II

Summary of the Series of Samples Tested

Expt.	Type of Cloth	% Resin* Applied	Curing Temp. ° F.	Time, Min.
1	80 x 80	8	260	2,5,9,15
2	80 x 80	8	290	2,3,4,5,6
3	80 x 80	8	350	1,2,3
4	80 x 80	2–16	290	6

* An acid-releasing type accelerator was used in a quantity equal to 3.5% on the amount of resin.

TABLE III

Effect of Drying and Curing Temperatures, and Curing Times on Resin Retention and Shrinkage Control* (8% Aerotex Resin M-3 Initially Applied)

Cloth No.	Resin Retained	Drying and Curing Temp. ° F.	Drying and Curing Time min.	Shrinkage %
289	1.9	230	15	2.5
290	3.9	230	30	1.9
291	3.4	230	45	1.7
310	5.2	260	8	1.1
311	5.5	260	15	1.1
312	6.2	260	30	0.8
313	6.5	290	4	0.8
314	6.8	290	9	0.6
315	6.5	290	20	0.6
Untr.	—	—	—	5.9
Untr.	—	—	—	5.0

* Shrinkage measurement after first laundering

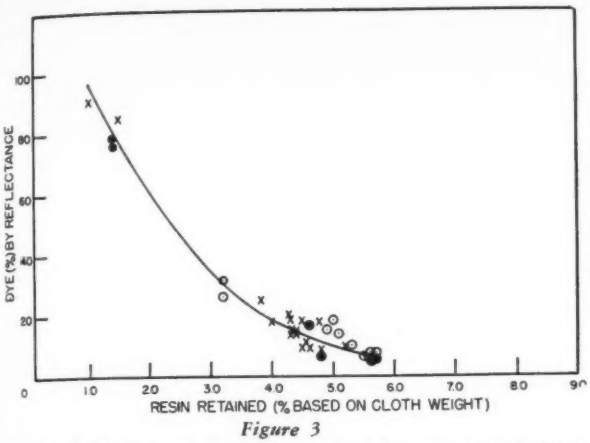

Figure 3

Dye by Reflectance vs. Resin Retained. 8% Aerotex Resin M-3 Initially Applied.

Dry-Curing Conditions

Point	*Tem. °F.*	*Time Min.*
X	260	2,5,9,15
Θ	290	2,3,4,5,6
●	350	1,2,3

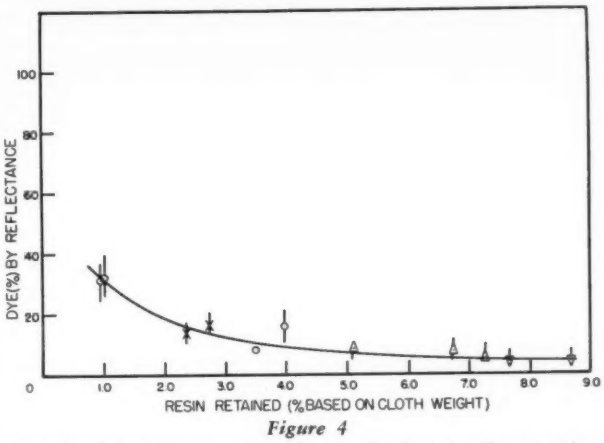

Figure 4

Dye by Reflectance vs. Resin Retained. Samples Dry-Cured at 290° F. for 6 Min.

Resin Applied

Point	*%*
O	2
X	4
Θ	6
Δ	8
+	10
∇	12

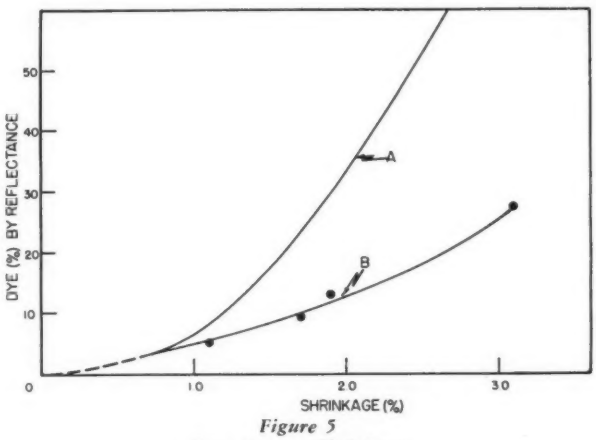

Figure 5

Dye (%) vs. Shrinkage

A. 8% Aerotex Resin M-3 Variable Curing Conditions. (Data from Figures 1 and 2).

B. 2-10% Aerotex Resin M-3 Cured for 6 Mins. at 290° F. (Data from Table IV).

varying amounts of resin on which shrinkage and dye reflectance measurements were made. The results are summarized in Table IV and plotted in Figure 5, Curve B. It is believed that for different applications on 80 x 80 cotton (e.g. 4% resin with various curing conditions), a different dye-shrinkage curve would be obtained, but the results would lie between Curves A and B in Figure 5.

TABLE IV

% Dye vs. % Shrinkage for Cotton Percale Treated with Various Amounts of Aerotex Resin M-3 and Cured for 6 Minutes at 290° F.

Cloth No.	*% Aerotex Resin M-3 Applied*	*% Dye by Reflectance*	*% Shrinkage*
2505	2	27.8	3.1
2506	4	12.9	1.9
2507	6	9.2	1.7
2508	10	5.2	1.1

In order to indicate the usefulness of the dye staining technique, the results of some tests are presented in Table V where the per cent shrinkage control derived from the dye strength method is compared with the experimentally determined shrinkage on samples after the first wash. It is evident that the dyestuff method provides a quick and reasonably satisfactory method for estimating percent shrinkage on cotton.

(Continued on Page 236)

TABLE V

Estimation of % Shrinkage by the Dye Staining Technique and Comparison with Actual % Shrinkage Measurements

Cloth No.	*% Aerotex Resin M-3 Applied*	*Drying and Curing Temp. ° F.*	*Drying and Curing Time min.*	*% Dye by Reflectance*	*% Shrinkage From Dye Strength*	*% Shrinkage Experimental*
2498	8	290	3	8.7	1.2	1.1
2499	8	290	6	5.0	0.9	0.8
2500	8	260	4	39.0	2.2	1.9
2501	8	260	9	20.0	1.6	1.9
2502	8	350	1.5	4.6	0.8	0.8
2503	8	350	3	3.9	0.8	0.6
2521	3	290	6	14.5	2.2	2.2
2522	5	290	6	7.3	1.5	1.7
2523	7	290	6	4.5	1.1	1.4

The Effect of Weathering on ROTPROOFED CORDAGE

C. H. BAYLEY and M. W. WEATHERBURN
National Research Laboratories, Ottawa, Canada

A CONSIDERABLE amount of work has been carried out recently on the efficacy of various chemical substances as rotproofers for cellulosic textiles and on methods for the evaluation of rotproofness. Methods of test in current use include those in which pure cultures of cellulose-destroying micro-organisms are used and also those in which the test samples are exposed to the action of the micro-flora present in the soil. Both types of tests are often preceded by treatments in which the sample under investigation is subjected to the action of water either by soaking in a vessel through which water is passed or by spraying with water, under controlled conditions. These leaching treatments are designed to duplicate in a rough manner the effect of rain on the sample during use.

Many of the above mentioned investigations were carried out under extreme pressure owing to the war and to the necessity of making quick recommendations regarding the possible efficacy of rotproofers when used outdoors. It was not possible, therefore, to provide for lengthy weathering tests. Some use has been made of accelerated weathering machines in which the samples are alternately sprayed with water and subjected to the action of light from a carbon arc. However, until more data are available on the effect of the various factors which enter into the operation of such machines as well as data on the relative performance of the various types of machines, the use of such devices as a substitute for outdoor weathering must be approached with some caution. While the leaching procedures referred to above can be expected to give an indication of the tendency of a given rotproofer to be removed from a treated fabric by virtue of its solubility, they obviously give no indication of the combined effects of rain, sunlight and mechanical motion caused by wind to which textiles are subjected outdoors.

A previous publication by this laboratory (1) has given data on the rotproofing efficacy of copper naphthenate when used on cordage, the effectiveness of the treatments being judged by the loss in strength shown by the samples after a two week burial period. It was shown that the presence of 0.3 to 0.6 per cent copper in the form of copper naphthenate in association with a waterproofing wax, provided adequate protection against rotting caused by soil contact. All of the samples used in the above mentioned study had been leached in water before burial.

There has been considerable discussion regarding the possibility of enhanced actinic degradation arising during the exposure to sunlight of textile materials treated with copper-containing rotproofers. Thus Armstrong has reported (2) that an excess of copper causes accelerated breakdown due to actinic degradation. More recently Fargher (3) has stated that the danger of enhanced degradation of cotton due to the presence of copper is small, but this conclusion appears to be connected with the fact that in his experiments most of the copper treatments investigated were removed from the fabrics fairly quickly by weathering. Bryant and Smith-White (4), working with jute hessian concluded that the effect of copper in promoting actinic degradation may depend upon the type of copper compound used.

In a recent investigation (5) of the effect of copper on cotton duck containing a wix-pigment-filler type of water-proofing mixture to which had been added various copper soaps no evidence of markedly increased breakdown attributable to the presence of copper was obtained.

The present investigation was undertaken in order to determine whether in the case of cordage of hard and soft fibers subjected to weathering outdoors, there were indications that the presence of copper soaps produced increased actinic degradation. The effect of exposure on samples treated with a typical cordage lubricant, pine tar, was also investigated. The study also included an investigation of the extent of removal of the various treating compounds as the result of weathering and the effectiveness of wax in preventing loss of copper.

EXPERIMENTAL

Materials Used

The fibers investigated were sisal, manila, North American hemp and "wartime fiber" in the form of 3 ply ⅜ inch diameter cable-laid cordage. Since considerable use has been made in Canada of cotton cordage in connection with tentage, etc., 3 ply cotton cordage, ¼ inch diameter in the case of the samples treated with copper naphthenate and copper oleate and ⅜ inch diameter in the commercially-treated sample containing copper naphthenate and wax, was included in the series.

The materials used in the various treatments were all of commercial grade and included copper naphthenate, copper oleate, a lead soap lubricant used in conjunction with copper naphthenate and a commercial wax proofer containing copper naphthenate designed to meet the requirements of specification OA 117.

Methods

(a) Treatments

The treatments involving the application of copper naphthenate, copper oleate and pine tar alone were carried out in the laboratory using solutions in Stoddard solvent, the strengths of the treating solutions being adjusted to give 0.1 per cent and 0.5 per cent of copper, in the form of the various compounds, and 25 per cent of pine tar (where required) on the finished dry cordage. Incidentally it was observed that the wet pick-ups of the hard fibers (sisal, manila and "wartime") were 20 to 25 per cent, and of the soft fibers (hemp and cotton) 43 and 39 per cent. respectively. The samples containing the lead soap lubricant and the commercial paraffin wax-copper naphthenate type proofer, respectively, were obtained from the Plymouth Cordage Co., Welland, Ontario and the Drummondville Cotton Co. Drummondville, Que.

(b) Exposures

The samples in 14-foot lengths were slung horizontally between racks with sufficient slack to allow for shrinkage due to wetting. They were exposed on the roof of the National Research Laboratories, Ottawa, July 10 to October 10, 1944 and April 10 to Aug. 10, 1945, a total of seven months.

Breaking strength measurements were carried out on an Amsler machine with 4 inches between jaws. The data reported were the average of 10 specimens from each sample. The samples used for obtain-

(Continued on Page 235)

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MAY 6, 1946

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To Manufacturers and Importers of TEXTILE CHEMICAL SPECIALTIES

American Association of
Textile Chemists and Colorists

Gentlemen:

The American Association of Textile Chemists and Colorists is again collecting material for a new Year Book. For this new 1946 edition, an especial endeavor is being made to obtain participation in the List of Textile Chemical Specialties by those firms which have thus far neglected an opportunity which has always been equally open to all manufacturers and importers for the listing of products.

At the same time it is of course desired that old participants revise and correct the listings of specialties which appeared in the 1945 Year Book.

In organizing either new or revised material for the list it is urgently requested that you follow the suggestions given on p. 453 of the 1945 Year Book. Careful consideration of these directions makes the work of the Year Book editors much easier.

Replies for this section of the Year Book must be received before June 1, 1946, to meet editorial schedules. It is hoped that this year better production conditions among printers will allow earlier delivery of the book itself.

Very truly yours,

Carl Z. Draves

A.A.T.C.C. Year Book Committee
435 Hudson Street
New York 14, N. Y.

THE TEXTILE PRINTING INDUSTRY IN GERMANY*

ELLIOT BROADBENT
Glenlyon Print Works

OUR investigation was conducted chiefly to discover methods of color application in Germany. The work was divided among four of us, each of whom was to cover a particular field: Glenn D. Jackson, the dyeing of synthetic fabrics; C. Norris Rabold, vat dyeing of piece goods; Thomas R. Smith, yarn dyeing in its various forms; and I was to cover the application of color in prints.

After traveling about 2500 miles through Germany I had seen exactly four printing machines in operation and these four printing machines were printing very coarse mixtures of spun rayon and flockenbast.

We had seen samples of German prints at an exhibition in Denkendorf and among them were some extremely fine examples of blotch work on viscose and Bemberg sheers. I was particularly anxious to see the color shop practices used in making up the color for this kind of work and also to watch them being printed. I had never seen blotch work on rayons as free from specks and unevenness as some of the samples shown at Denkendorf. You can imagine my disappointment at not being able to see them actually printed.

As you people in the printing business know, a printing machine standing idle and dismantled tells exactly nothing. There was little to be learned either from watching four single color machines creep along on cheap work which would be printed over here at about 100 yards a minute.

If it had not been for my many consultations with the I. G. specialists at Hoechst, my trip would have been of little value. However, in the printing laboratories at Hoechst, they had samples of all the different type of work printed not only in Germany, but in all Europe. These samples had been gathered from time to time by the I. G. printing experts and the formulas and methods used were on record there.

After each trip around a series of plants, we would once again visit Hoechst for further discussions.

The I.G. offers excellent facilities to the dyestuff consuming industry and it is rather surprising to find the German printing industry extremely reactionary toward new chemical techniques. Actually some of the most advanced ideas conceived and developed at the I.G. get their first practical trials outside of Germany. An outstanding example of this was the Kuppensaure and Elektro-fixierer processes which we had to travel to Vienna to see. Incidentally the Kuppensaure system of application of vat dyestuffs is of no value in printing due to extremely low rate of affinity of the acid leuco.

On the other hand the Germans quickly take up new mechanical ideas. For instance most plants are equipped with jigs, padders and dye reels of the latest type. The coverings of the dye reels in well equipped plants are generally better than ours. The Germans use mostly glass and only sufficient stainless steel to support the glass whereas we use mostly steel and have small glass windows. The visibility in the German enclosed reels is excellent. Overfeed tenters of good design are in evidence in most of the plants and we saw continuous open soapers with individual D.C. motor drives that are equal to the best free-running open soapers in the U. S.

Production is very low in most German print plants and they consider one million yards per print machine per year a good average production. In only one plant did we note where this had been exceeded. That was at Gabriel Heroze in Constance where they had averaged two million yards. However I should point out at this plant they have extremely long runs, sometimes having a pattern in the machine for three days. It is difficult to determine the length of runs in the lower producing plants. For instance at Heidenheim, they have combinations as low as 300 yards. On the other hand they are not commission printers and are able to couple or group a series of orders so that they often make reasonably good runs.

There are no consumer standards of fastness similar to those in the U. S. At one time I.G. set up their Indanthrene standard which limited the user to vat colors. This soon fell by the wayside, as it was impossible to produce high styled goods with vats only. Later this was modified and certain azoics were admitted provided they would meet the Indanthrene test.

Most plants doing quality work set up their own standards and try to live up to them—certain companies being known for selling goods of high standard of fastness.

Although the Germans claim that their white discharges must be good to satisfy their trade, they are usually much poorer than ours. Generally their discharge work is not as good as ours. For pigment they prefer a mixture of zinc oxide and titanium. They claim that the added zinc combines with the hydro to produce a better white. Their results certainly do not prove this. I began to feel that possibly I had forgotten what our own whites looked like, so I sent home for some discharge cuttings produced at Glenlyon. After seeing these the German Whites looked much worse. I showed my cuttings to the I.G. chemists at Hoechst and they agreed that they far surpassed anything they did in Germany.

By the addition of Mattweiss, a mixture of polymerized resins and titanium to their discharge paste, the Germans have produced extremely fine line white discharges on dark grounds. These showed absolutely no tendency to swell. Developed blacks are favored over formaldehyde aftertreated blacks for discharge grounds. Although the formaldehyde blacks are well known, the majority of printers feel that they lack sufficient fastness.

Discharges on goods containing acetate have been produced by first saponifying the acetate. At the time of our visit to the Neue Augsburger plant, they were doing a considerable quantity of this work. We asked the I.G. if they had ever put out a line of dischargeable colors. They showed me their line and said that they had not been very successful and that therefore I.G. had not pushed them.

Discharges and resists on Variamine Blue grounds are common in most plants. The beautiful orange and white on blue combinations which are so popular with much of the peasant trade could be produced in no other way.

As I have said earlier they do some excellent blotch work and this is particularly true on synthetics. A very extensive use of azoics is made for this purpose. Although the use of azoics is prac-

*Presented at meeting, Rhode Island Section, February 22, 1946.

ticed in the United States on synthetics, they are not used here for this purpose to the same extent as in Germany. On many patterns which would be done discharge on rayons in the United States, the Germans print blotch. I attempted to find the reason for their excellent blotches. My queries yielded the following. All the people I questioned agreed that very little set should be employed on the blotch roller and that mixtures of British gum and industry gum were preferable to starch thickeners. Industry gum is made by cooking low grade Senegal gum under pressure, then drying the resulting paste on a heated drum. This dried paste is sold to the trade in this form and is readily soluble.

They all agreed that grounds around 35 lines per inch yield best results. The I.G. chemists claimed that Etingal A (triiso-butyl-phosphate) helped to smooth out blotches. One plant chemist said Etingal A is a defoaming agent only. Another plant chemist said the same and added it is not a very good defoamer. Still another claimed it is not good for anything and a fourth said it was excellent for smoothing blocthes.

A more general use is made of resist printing in Germany. Resist under Indigosols and vats are used on synthetic dress goods to a fairly large extent while in the U. S. this work is confined chiefly to shirting styles.

Many of you will recall that some years ago I.G. brought out Rapidogen Developer N. This product was to be used to replace the alkali in the Rapidogen paste and by its use it was claimed that Rapidogens could be developed in the steam ager. It was found to be unsatisfactory. Since the start of the war Rapidogen Developer NN has been developed which the I.G. claims really works. Some of the printers in Germany claim that it does work, others claim that the development is not complete.

Color shop practices are usually very good. In most plants the dyestuff was stirred into the paste by means of mechanical stirrers. The resulting paste is then passed thru a vacuum strainer which has a capacity of about 25 gallons in five minutes.

Some plants use a single roller mill for an aid in dispersion. This mill will remove grit or small metal particles or even lint from a print paste. It is claimed that this mill is better than the three roll mill or the colloid mill. The experts at I.G. claim the colloid mill is entirely unsuitable for print pastes as it breaks down the structure of the paste. This mill has a capacity of 20 gallons per hour.

The I.G. claimed that the use of Collo- resines had increased during the war due to the lack of orthodox thickeners. They also claimed that the German printers now preferred them to other thickeners. This was not corroborated anywhere in the plants. Most printers favored the customary starches, gums and natural gums.

Ninety per cent of the Indigosols used in the German printing industry are applied by the nitrite process. In addition to the nitrite used in making up the paste, additional nitrite is added to the first box of the open soaper immediately before the acid developing box. Some of the Indigosols are steamed before developing and some are given a hot acid treatment.

The use of indo carbon black is preferred to vat black when falling under white discharges. This product has generally fallen out of favor in the United States due to its tendency to scum. The Germans have found the same trouble but think that the better black produced by indo carbon is worth the trouble.

Diphenyl black is used extensively on blotches on synthetics and fine cottons in preference to aniline black as diphenyl black causes much less tendency to tender the goods. This use of diphenyl black for this purpose is also common in England.

Much has already been said about the new line of acetate colors, the Astrazones; they apparently are not applicable on the roller printing machine as they flush too readily. They have proved their value for screen printing.

Although there is considerable interest in pigment printing, so far little has been done. The I.G. has done some work on this type of work and they are convinced that the oil in water phase is more desirable than the water in oil system.

Cuttings which they have produced show slightly better fastness to repeated washings than cuttings from the U. S. which they have tested at the same time. However it should be pointed out that the I.G. work was on laboratory scale only.

The printing machines we saw were of good construction. The doctor oscillating mechanism is slightly different from ours but in principle is the same. The lappings are coated with a Latex film which they claim increases the life. The blankets are of the mackintosh type and they run from 60 to 100 meters in length. The back greys are higher quality than ours. They use no blanket washers. Furnishers are exactly the same as ours. Most printers favor brushes. The Germans use a range of twelve doctor blades varying from .30 mm. to .85 mm. Generally their use of doctors is similar to our own for similar patterns. They also back up fine doctors with heavier ones.

At Konstanz we saw the curved doctor blades invented by the engineer of that firm. This invention is described in page 867 of the 1930 *Annual Melliand*. It is claimed that a large angle of slash can be used by means of this blade. We did not find them in use in other plants and were told that there were two reasons for this—(1) the printers objected to dressing these doctors and (2) their use necessitated the use of standard size print rollers. Only plants who deposited copper on shells could operate on standard size copper.

One particularly interesting printing auxiliary is the Flu Tex light. This consists of a quartz lamp fully shaded from the operators eyes. This lamp is hung on pulleys from an overhead wire track and can be moved readily from side to side. Instead of using the regular sighteners in Rapidogen and discharge pastes, fluorescent salts are added. The slightest defects will be shown up due to the ultra violet light from the quartz lamp being reflected from the fluorescent salts in the paste. This makes it possible for the printer to see defects in these difficult types of printing very readily.

There is as much difference of opinion regarding agers in Germany as in this country. Some develop steam in the pond by closed coils, some blow live steam thru the pond; one plant has small steam generators outside the agers and another plant had a system of automatically moistening the steam by means of a cold water spray in the main line feeding the agers.

A cottage steamer where the pieces were hung by the selvages on a star frame seemed interesting. The star frames entered the steamer on a track. It seems as if this could be loaded and unloaded much more easily than ours.

Acid agers in Germany are usually old iron steam agers which have been painted to protect them. A common paint for this purpose is lead oxide, thinned with turpentine and to which is added chalk. After this has hardened a coating of silicate is put on. This is renewed every three months.

One plant has two stainless steel agers and another plant has built an iron ager which is composed entirely of steam chests on sides, back, front and roof. This is said to be quite successful.

Before closing I should say a little about engraving. Pantograph, machine and photographic methods are all used. A far greater amount of machine engraving is done in Germany than we use. They have the same objections to photo engraving that we have, that is, that only the design coloring is usually good. One

(Concluded on Page P229)

DYEING DEVELOPMENTS in GERMANY

G. D. JACKSON, JR.
United States Finishing Co.

FOR many years the American dyer and printer has been under the impression that Germany must excel in the ancient arts of dyeing and printing. The Americans who had this idea in the United States probably drew this conclusion from the history of German dyestuff manufacture and the excellence of a good many dyes and auxiliaries marketed by the Germans in the U. S. A. It was felt that the Germans apparently had an enormous force working on research in all fields and it was therefore assumed that this would automatically extend its effects to every phase of industry.

The first textile team to be sent to Germany to study the advancements made by the German dye and print plants during the War, found the above thoughts to be true only in a few small spheres of finishing plant operations. Our textile team which landed at Frankfurt on October 17, 1945 soon arrived at a similar conclusion, namely, that although I.G. Farbenindustrie had sponsored extensive research, very little of this new accumulated knowledge had been put to trial in the printing, dyeing and finishing plants of Germany or Austria. We found only a few examples of real progress in dyeing methods in the plants visited, and study of these was rather difficult due to the fact that most facilities were not operating because of the lack of coal and grey goods. In several instances plant directors told us they had heard of one development or another which I.G. Farbenindustrie had circularized or suggested; but, due to war production, had not had time to investigate or make any trials.

The team therefore found its most profitable source of information on new developments to be the various I.G. Farbenindustrie plants where laboratory experiments and pilot plant samples were studied. Some of these color and finish experiments seemed of enough importance to follow up with German finishing plants and became one of the routine checks made at each plant.

By and large most of the promising developments had found little or no use in the plants visited. However, since the practices of foreign plants are of interest to us, even though our methods may be superior, our team reported rather completely on processes and machines inspected. All plants inspected by this team were engaged in converting goods for their own accounts.

German plant equipment is in many instances unique, clever and well designed. The speed of these units is invariably slower than would be acceptable under American operating economy, and labor employed is excessive. Dyeing equipment is particularly well designed but their becks are too small for our larger production lots.

In general, German methods of dyeing rayon, acetate, cotton, flax, and perlon (nylon) have been similar to those of the United States. The jig, dye kettle, pad and certain continuous machines are used in the same manner and with the same types of dyestuffs. However, the one glaring example of Germany's lack of progress was the failure to develop continuous vat dyeing equipment. With the exception of Indigosol open-width continuous machines and naphthol and aniline black ranges, little or no use of continuous dyeing equipment could be found in Germany. I.G. Farben had suggested a new method for continuous vat dyeing, but it had not been put into plant practice. Vats were dyed by the pad-pigment method or by straight jig application, these methods being entirely familiar to our industry. Variations in chemicals and assistants used were negligible. Maintaining the large German army in the field would seem to call for greater speed and economy in vat dyeing and a continuous method would have paid big dividends, yet the army continued with sulfurs and vats by old methods. The new vat dyeing theory advanced by the I. G., namely, the "vat acid" process, a search revealed, was not accepted by the German plants. The I. G. stated that only four plants had tried the "vat acid" (Kupensaure) method as a continuous operation with the "Electrofixier" (an electric developer or ageing machine). These plants were located in Vienna, Prague, Budapest, and Italy. The German dye industry is definitely reactionary and seems to look askance at any chemical or revolutionary change such as continuous vat dyeing.

Direct colors were used to dye a large percentage of cottons, rayons, Bembergs and mixtures. Sulfur colors were used on heavy army spun rayons, cottons and mixtures but on the samples seen, penetration was generally poor on dark shades. A new type of pre-reduced sulfur colors named "Imedialsols" had found some use in a few plants and the reaction of plant chemists to this color was that of approval. These dyestuffs are the subject of a QMC consultant report which will soon be published by the Department of Commerce.

In one plant, Gabriel Herose' in Konstanz, the original Turkey red print was developed in a series of continuous rope machines. The company was still using this color on printed scarfs and kerchiefs, claiming it to be the best red. When acetates were to be printed with dyed grounds, the plants saponified the acetate first, then dyed with regular viscose type rayon colors for discharge.

Perlon, the German nylon, had been dyed by very few plants and although a new line of colors "Perlon Fast Dyes" had been worked out at I. G. Ludwigshafen, they had not been marketed or applied in actual production; acetate dyestuffs were the type in use.

The War had not prohibited the use of vat colors, and it was stated, few restrictions on the purchase of dyestuffs, were in effect. The Reichstelle, a counterpart to our WPB, did limit printed patterns to three rollers and a dyed ground where the goods were for consumption in the greater Reich, but fabrics for export could be printed in as many colors as desired. Germany wanted to make sure that her goods in foreign markets would be attractive.

Bemberg sheers found wide use before the War and the best printing plants inspected by this team were found to be specializing in Bemberg sheer prints. These were usually causticized and beck dyed with dischargeable colors.

Pad dyeing of direct light color grounds was common practice and naphthol prepared fabrics for printing were employed extensively. Naphthol ranges were standard with only minor mechanical variations to ours. Pigment dyeing with resin binders had found no acceptance in the trade and although I. G. Farbenindustrie at Hoechst had done some preliminary work on same, it is believed this method of color application had been given little publicity and research lagged far behind that in the U. S.

Cotton was gradually replaced during

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World War II by synthetic fibers so that by the time of the German surrender only a small percentage of cotton was included in the piece goods output. Hence only here and there in Germany did this team run into active operations on all cotton fabrics. The German spun rayon (Zellwolle) was at first blended with cotton or with flockenbast to produce military and civilian fabrics, but we found many of the fabrics had been converted to 100 per cent Zellwolle by the end of the war. These fabrics were prepared exactly the same as if they had been cottons, that is, they were singed, malted, scoured, bleached and dried. At first it was thought to be an illogical German conclusion that since spun rayon was a substitute for cotton, the spun rayon should naturally be handled in the same manner as cotton, including the bleaching. However, as study of the industry progressed typical German grey goods were further observed and many fabrics found to be made of a rather noticeable yellowish spun rayon. This investigator is not aware as to whether this condition could have been overcome in the viscose manufacturing plants, but is sure that the light fastness of the final dyeing would be depreciated if this condition were not rectified in the preparation for dyeing.

Most spun rayon fabrics were first singed with the common type of gas compression flame burner. In one plant the singeing machine was in a small separate room where the dry grey cloth, whether cotton or spun rayon, was given a beating and brushing to remove all lint, thread and dust before going into the wet processes. This kept the bleaching and mercerizing liquors much cleaner. Saturation with a malt seems to have been standard practice for spun rayons and cottons regardless of warp sizing. In all plants visited the desizing agent was padded on the goods with a two or three bowl pad but with one exception, the Neue Augsburger Kattun Fabric, where excellent penetration was obtained by dipping three times in a tank and squeezing between dips. The length of time the conversion reaction was allowed to continue varied from overnight in box trucks to as much as three days in deep concrete pits.

Kier boiling was apparently standard procedure for cottons before the war but its use had constantly become less in Germany with the advent of synthetic fibers. Mercerizing processes were not allowed during the war in order to save labor, fuel and chemicals.

Filament rayons and acetates, unless of the thick and thin or crepe variety, were scoured and bleached on the jigs with the usual detergents and bleaching solutions.

As stated previously Zellwolle (spun rayon) made up the greatest part of the German rayon production, and since filaments were in less proportional demand in Germany than in America, it invariably followed that on days when we visited these plants there would be no filaments in process. This, coupled with the meager amount of dyeing equipment operating in the French and American Zones, leaves our experience somewhat lacking in filament yarn fabrics. One of our investigators who visited the British Zone near Krefeld did find a few filament crepes in the dye boxes. Samples of viscose rayon taffetas and twills dyed with sulfur, direct and developed colors showed a very warpy condition due to uneven color absorption in the various warp yarns. Although this condition is occasionally seen in American woven filament yarns, the effect was fairly general in all samples inspected in Germany.

Most German dye plants operated a very modern and efficient looking type of dye beck. These were tile lined and completely hooded. Some stainless steel linings were in existence but tile linings were in the majority. Management in Austria preferred the steel kettle, but the German dyers boasted of their tile lined kettles from Chemnitz. The cement holding the porcelain tiles together was said to stand up under constant use at all temperatures for five to ten years. The rods on the elliptical reel are solid porcelain with a bore through the center for a stainless steel supporting rod. The shape of the rod with its corduroy face apparently accounts for the fact that the reel seems to pull any weight fabric out of the dye bath without slipping. The smaller reel on the front of the beck is made up of round solid porcelain rods with smooth surfaces. The false front or baffle in the kettle is constructed of a network of small porcelain pieces which drop down into porcelain racks, thereby making a baffle that can be replaced in part or in whole quite easily. The housing is vented by a chimney with trap door in the roof. This trap door opens automatically when either front or back glass door is raised, being connected by a system of levers. The counter-balanced glass sliding doors open the full width of the kettle and are raised by cranks. A stainless steel cover across the front of the back has a trap door for the addition of color and chemicals.

The becks seen in Switzerland were similar in design but were lined with stainless steel instead of tile and color was added by hot water injection.

At Wangen a hot water system was used for heating this type beck as well as their jigs and other plant processes.

From the above it should not be assumed that all becks in Germany and Austria are of this commendable design. Many antiquated models were also located in these plants and still were being used for heavier goods.

As to the styles of rayons handled on these newer becks, it was noticed that the light weight fabrics and sheers seemed to be given preference while the heavier spun rayon cloths were dyed on the older type reels or on jigs. This latter practice of dyeing heavy spun rayon suitings on jigs may account for the undesirable luster prevalent on many heavy suitings inspected.

Color penetration on heavier Zellwolle fabrics and mixtures of Zellwolle and other fibers that were jig dyed often was far inferior to commercially acceptable U. S. goods. In several plants jigs were arranged in line with pads, developing boxes and finishing mangles, so that a semi-continuous process could be operated. This arrangement may be in use in the United States; however, the best of these set-ups seen in Germany at Wangen we deemed well worth consideration.

It consisted of first a two bowl pad and six constant-speed tensionless automatic jigs, followed next by a dip tank, squeeze mangle and finally a double dip tank and three bowl pad or quetsch. In this line, following the first pad, was a swing which could be used when padding only was desired. Cloth could run continuously through all pads and jigs, and when dyeing Indigosols a skying followed the first jig which contained the acid. Vats were processed by pigment application on the first pad and threaded directly from there to any individual jig in the line when the dyeing proceeded in batch form. The strand of open padded cloth was carried over any or all jigs on idler rollers attached overhead on each jig frame, thus allowing the loading or unloading of any jig while the others were operating. A jig could be unloaded and cloth given aftertreatment simultaneously by threading over any other jigs to the last mangle or pad in the line and swung off into boxes.

This arrangement presents interesting possibilities for many types of wet processing.

During the war I. G. Farbenindustrie developed a product called Anthrasol Salt NO for use with Indigosol dyes to prevent over-oxidation by the nitrous acid. They claimed in 1942 when this product was first marketed, that Indigosol Blue IBC and Olive Green IB, two

of the most sensitive colors to this detrimental effect, could be developed up to 40° C, with Anthrasol Salt NO in the developing bath and extremely level dyeings produced. When developing continuously the unavoidable accumulation of nitrous acid in the sulfuric acid bath was avoided by the use of this product.

The dyestuff team which had studied new dyes and textile chemicals in Germany prior to our arrival had studied this product and found it to be thiourea. Our team found three plants that were using Anthrasol Salt NO for indigosol dyeings and found it quite helpful. When padding the Indigosol colors by the nitrite process, two to four grams per liter of the salt were used.

Two plants operated extremely modern and up-to-date open soapers which were used for Indigosol development and washing. These were comprised of 10 boxes, with individual D.C. motor drives and compensators between boxes, with excellent hot water, cold water, soap, acid feed, spray and overflow piping. The individual motors drove through right angle gear boxes thus allowing them to be mounted on end alongside of the machine, and not projecting into the aisle taking up valuable floor space. The units were hooded and the steam exhausted by fans. Both units were preceded by color pads and had a skying arrangement to give time for acid development before rinsing and neutralizing. Washing followed in rope washers, the same process being used both for rayon or cottons or mixtures.

While no experimental work or production could be located on resin bound pigment dyeing and printing in any of the plants visited in Germany or Austria, some laboratory trials had been made at I. G. The plain dyes in light shades produced on laboratory equipment were soft, possessed good fastness properties and seemed to show some promise. For plain dyes the resin binder used was a mixture of 60 per cent polyvinyl acetate and 40 per cent urea formaldehyde, using ammonium sulfocyanide (NH_4SCN) as a catalyst and Soromin AF as a softener. The padded cloth was flue dried and then cured at 145° C. To produce firmer finishes, such as sleeve linings, the resin content was increased.

No new methods of dyeing acetate, Perlon (German nylon), glass or polyvinyl fibers were discovered, although the dyestuff team who were in Germany ahead of us did report on some new dyestuffs and one new method of dyeing vats called the "Vat Acid" or "Kupensaure" method. Briefly this vat acid process consists of preparing a solution of pigment vat with caustic soda and then with a dispersing agent present, acidifying the sodium leuco to a point where hydrogen replaces the sodium and an acid leuco is formed. This acid leuco of many of the vat dyestuffs is more finely divided than the sodium leuco and shows less surface affinity for the cellulose. Penetration of the fiber is therefore supposed to be better and irregularities in padding are said to be less because of the lowered affinity and smaller particle size. After "vat acid" padding, the fabric is flue dried, then padded with caustic and hydrosulfite and the sodium leuco again formed in the fabric. Vat dyeing then proceeds in the regular way. We failed to find this process being used in Germany but in a plant outside of Vienna we saw a continuous machine that had run thousands of yards by this method, employing a small electric ager after the reduction pad to hasten and complete the reduction. This ager was called the "Electrofixierer" as heat was maintained at an inside temperature of 180° C. by electric heating rods. The ager contained only about 15 meters of cloth at any one time and the speed was about 35 meters a minute. The goods then proceeded to an open washer for oxidation, rinsing and washing.

This continuous vat dyeing machine and "vat acid" process was stated to produce more level dyeings, have less streaks and shading, and be more economical than previous pad-jig vat dyeings.

Finishing processes in Germany were conventional but lacked the technique and advancement seen in our own industry. While melamine and urea formaldehyde resins were manufactured by I. G. Farben, this team found no plants that had run more than a sample or two of resin finishes and their experience was of no value to us. Cation and anion-active softeners had been used extensively and we found starches, oils, gums and waxes still the chief German finishing materials. Application of these materials as well as resins where tried, was usually on a mangle or quetsch ahead of a covered tenter frame. The new tenters were of excellent construction and were equipped with overfeed mechanisms on pin clips for shrinking the fabrics. Some frames employed a double clip having both the standard clamp and pins arranged on the same clip of the chain so that the frame could run as pin or regular tenter.

It was claimed that residual shrinkage on spun rayons could be kept below 5 per cent by the use of the over-feed attachment. The newer tenters were well housed and ventilated, having electric cloth guiders, motor driven curled selvage removers, electric stops for clip-outs, and cloth moisture content recorders. In one plant a new tenter had been mounted about 8 feet off the floor, thus allowing clear floor area underneath where boxes of unfinished work could be lined up waiting to be finished.

Sanforizing machines had been licensed and installed in about eight plants throughout Germany, but we only visited one such installation. The machine was exactly the same as the American type.

In two different plants three-bowl calenders were observed which employed a continuous felt blanket about 5 yards in circumference that ran through the two nips with the cloth. This calender was supposed to produce a deep soft luster on cottons, but no samples to illustrate could be found.

Chasing calenders assumed immense proportions; one we noted had 13 bowls and ran up through two floors of the plant.

Other calenders, short frames, dry cans and loop dryers were of good mechanical design but were used only for conventional finishing.

A method of measuring crease-resistance in fabrics was used by I. G. Farben which appealed to those of us interested in resin finishes. Although to date no conclusions have been drawn as to comparison of test results with American and British methods, tests and tabulations are being made here by our team.

A piece of cloth approximately 5 inches square is conditioned and three strips measuring 4.5 cm. by 1.5cm. are cut from the sample at a 45° angle to warp and filling yarns. These samples are then folded back at a point 1.5 cm. from the end, placed between two glass plates and weighted with 500 grams for three hours. The weight and the upper glass plate are then removed and the three folded samples allowed to start their recovery. Angle readings of the folds are taken with a small protractor at 5 minutes after the weights are removed and again after an hour interval. The final angle values reported are the average of the three strips measured. The fact that a 5 minute angle reading as well as a 60 minute angle reading make up the test gives the results more meaning. Some fabrics will show their greatest regain in the first few minutes but these probably will not be the best garment cloths. Those which gradually straighten out to 130° or better in an hour are said to be the most serviceable crease-resistant finishes.

NOTIFY THE
NATIONAL SECRETARY
IMMEDIATELY
OF ADDRESS CHANGES

CONTROL INSTRUMENTS

and their Application to Textile Dyeing*

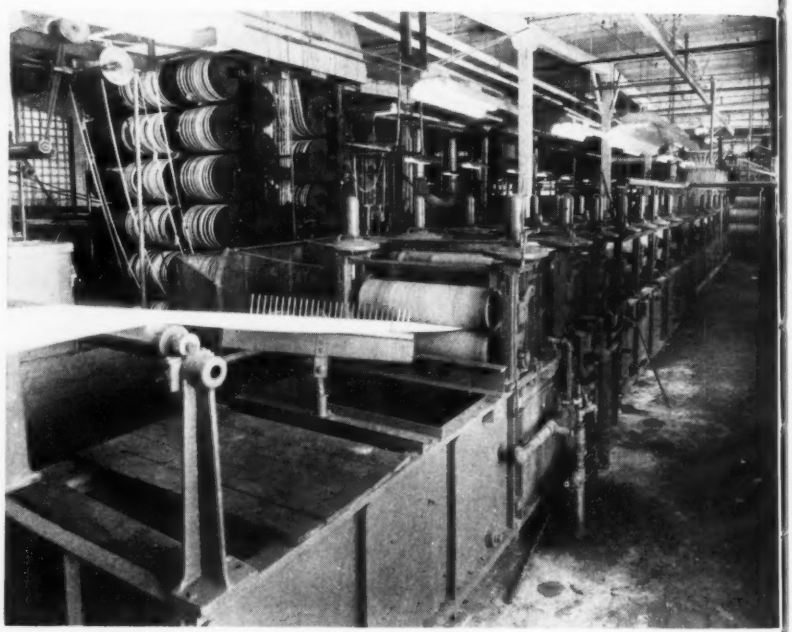
WALTER H. RIDLEY

Engineer, The Foxboro Company

FROM the viewpoint of the industrial technician, the whole progress of civilization has been Man's endeavor to perform the processes of production more and more efficiently—that is, with less and less expenditure of time and effort. Once upon a time, some prehistoric man got the idea of catching a wild horse, or an ox, and harnessing it to do the chores which six men had previously done. Then, ages later, someone invented the steam engine, to do what six horses used to do. Then the electric motor came along, to do some of the things which the steam engine did imperfectly. Now, we are told, we are on the threshold of an atomic age, when a split atom will perform wonders beyond the powers of every-day electric current.

In a very small fraction of this long stretch of history—indeed, within the lifetime of most of us here—the whole science of automatic control has been developed. Its usefulness and benefits have extended to every corner of every industrial field, and such a development as we shall consider here, this evening, could be traced in almost any other industrial field in similar terms. But we are interested in its application to processes of the textile industry, and we shall find there, or even in one specialized operation in that field, all the material and examples needed.

In any study of automatic control, we ought first to understand its use and purpose; and that is a very easy point to define. There are things which a human being can do better than a machine; and there are certain things for which the machine is better. The dividing line is clear. If it is an operation which requires intelligence—if judgment is required, and someone must use his thinking power—then a human brain is necessary, and there must be a man on the job. But if the operation is routine or mechanical, if something must be done at regular periods of time, or if the same thing must be done over and over without interruption and regardless of fatigue, boredom, lunch hours, traffic delays or other influences, or if numerous valves must be operated at various remote points, faster than a man can conveniently scramble around and reach them all—then automatic control is easily superior. In short, there is practically no operation in industry today which is purely mechanical which an instrument can't perform more faithfully, accurately, efficiently and economically than the most conscientious employee can perform it.



Pneumatic Loading Squeeze Rolls on a Continuous Dyeing Range.

In the application of instrument engineering to the textile industry (or any other) the early opportunities to save time and effort were conspicuously great. In some mills they still are! But as textile instrumentation has progressed, the opportunities for major savings of time and labor have become less conspicuous. This does not mean that instrument engineering has reached its final goal and that there is nothing left to be done. But it does mean that the operations which, today, are not under instrument control are principally those which, by their very nature, are not subject to mechanical adaptation and which, therefore, must continue to require the present amount of time and labor—unless the operation is radically changed, either by eliminating it entirely or by revising it so drastically that it would hardly be recognized for what it used to be. Continuous piece dyeing, open width of cotton with the pad steam dyeing, or the Williams dyeing method are good examples. The multi-lap process for continuous wool dyeing is another.

However, even in such operations as these, as well as elsewhere throughout the mill, there are definite opportunities for instruments to make their important contribution toward overall efficiency and economy. Once an operation has been studied and defined, it becomes a relatively simple problem of instrument engineering to find the ways in which instruments can save time, save man-power, save the need for supervision, save chemicals or steam or water or other materials, or increase the rate of production, all with positive assurance that uniform standards of quality will be maintained.

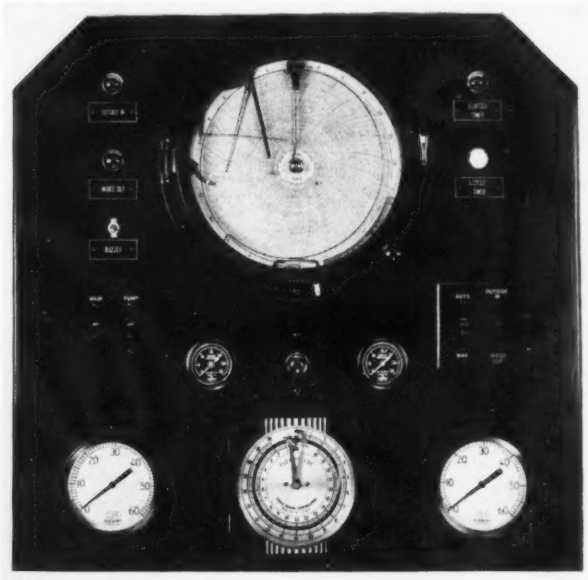
* Presented at meeting, Rhode Island Section, March 22, 1946.

One or another of these objectives is the reason for every instrument in the mill, however simple or complex the instrument may be; and as we trace the progress of mill instrumentation, we see that this has been true. Every instrument, in years past, has been purchased as an aid to efficiency. Every instrument now being installed has the same purpose. And every instrument that will be developed and sold in the years to come will be for the purpose of promoting, still further, the efficiency and the economy which are the two fundamentals of successful mill operation.

Despite all the progress that has been made, there still remains much educational work to be done in the textile industry. We all know that there are mills in which the dyer is still getting along with a glass stem-type thermometer, which he dips into the dye bath to make sure the temperature is somewhere near the point where it is supposed to be. Certainly that method does not contribute much to the time-saving, labor-saving overall endeavor; nor is it a reliable insurance of uniform quality in the dyeing. Let us take that old-fashioned method as a zero, or starting point, and see what improvements might be made. The slides which you will see on the screen will trace these same steps of progress and show the respective instruments mentioned; but even at the risk of repetition, let us take a moment to render aid to our hypothetical friend, the dyer with the stem-type thermometer.

The simplest and most obvious improvement is to install a dial type indicating thermometer on the dye tub. This inexpensive instrument, with its large, easy-to-read figures, can be conveniently mounted on or near the dyeing unit. It measures continuously, and its information is always available, at a glance. It is equipped, as you undoubtedly know, with a thermal system consisting of a stainless steel sensitive bulb located in the dye tub and connected by stainless steel tubing to a coil spring inside the instrument case. The whole system is sealed and contains an expansible liquid, or liquid and its vapors; and when the bulb gets hotter because the dye liquor is hotter, the liquid and vapors in the thermal system expand, and the coil spring endeavors to uncoil. This uncoiling effort causes a corresponding movement of the pointer on the dial.

The thermal system, that is the measuring unit, is essentially the same in all temperature measuring instruments. Various types of springs are used, and different metals and different fluids for different applications; but the operating principle is the same. In a recording thermometer, the uncoiling of the spring moves the recording pen over the chart, instead of a pointer on an indicating dial. And, speaking of recording thermometers, that is the next step of improvement to be recommended, for it is almost an axiom, in process control, that an operation worth measuring is usually worth recording. When considering the application of an instrument the purchaser should ask himself, "Will a record of each day's operations provide me with a useful daily check, and a continuous history of daily operations, as an operating guide, or for a sutdy of plant costs, or for future reference?"



Package Dye Machine Control Panel. This is a time, temperature and intermittent dye flow reversal control.

After measuring comes control. The simplest form of automatic control for dye bath temperature is provided by the single-action controller, also known as the on-off, or open-and-shut controller. Its function is very simple: to open a steam valve, gas burner or other heat supply, when the liquid in the dye tub falls below a certain set temperature, and to shut off the heat supply when the liquid starts to rise above that temperature. In addition to the measuring system we have described, the instrument has a control mechanism which, at the predetermined temperature point, pneumatically operates the control valve, wherever it may be located.

A duplex controller performs two functions of this kind. For example, exhaust steam may be used to bring a tank up to a certain temperature, but to bring the temperature still higher the live steam valve must be opened. Or, in certain operations, a steam valve may be controlled and also a cold water supply. But the duplex controller is merely an elaboration of the on-off controller; it still merely opens or closes a valve, or two valves. No really new function has been added.

(I am not going to interrupt this discussion of the development of dye tub control by digressing into an explanation of proportional, or throttling, control. That subject is a very big one, and one in which the industrial world has seen some of the most remarkable engineering accomplishments. But it is a complex subject and not specifically related to the problems of textile dyeing; so we will confine ourselves to the types of instruments with which we are more immediately concerned.)

Please remember that from the beginning—right from the time we installed the dial type indicating thermometer on our nameless friend's dye tub—we began to make progress toward our objective—to save time and human effort. We are still advancing in that direction, with each one of the steps we are tracing. Each improvement in instrumentation represents a corresponding improvement in efficiency of operation.

Thus, when the single-action temperature controller was first applied to textile dyeing, there were those who exclaimed, "This is *it!* Nothing more can be desired." But there were others who said, "No; this is good, so far; but let's see if we can't do still better." And so the elapsed time-temperature controller

was developed.

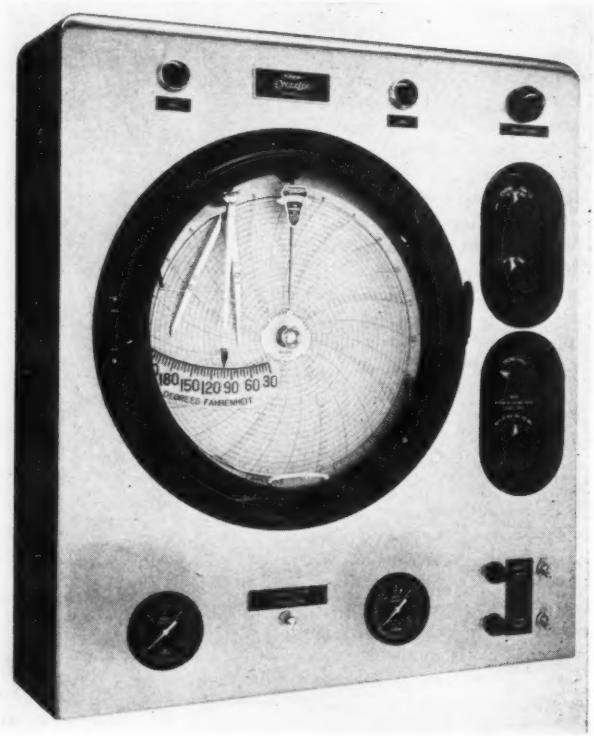
This instrument operates when the dye liquid reaches a certain desired temperature, and its function is to hold the liquor at that precise temperature for exactly the desired period of time—four minutes, twelve minutes—whatever it may be. At the end of that period it shuts off the heat supply and lights a signal lamp, to call the operator's attention. Brain power is still required, and the operator comes and supplies it. The elapsed time-temperature controller is in widespread use, and is being bought and installed every week, for applications of many kinds. It is practically standard equipment for hosiery dyeing, and equally recognized for the packing of certain food products.

The next step of development is the deferred action type of elapsed time-temperature controller. In this instrument the control action—that is, the operation of the steam valve or other heat supply—does not begin until the process liquid has come up to the desired temperature. Thus, a tub may start full of cold liquid, but when it reaches 160° F. or whatever the correct processing temperature may be, the elapsed time, or timing period begins, and the instrument maintains the desired temperature for the correct period, six minutes, eleven minutes, or whatever the cycle requires.

Both the standard elapsed time-temperature controller and the deferred action type of instrument have infinite variability as to adjustments of time and temperature. The time required to set either instrument for any desired dyeing schedule is only a second or two.

For the dyeing of a yarn, fiber or fabric of the same material, the same size, and the same formula, over and over, there is another type of instrument to be listed in the category of controls. In reality it is two instruments, the first of which has a driving mechanism revolving a cam, cut to a shape representing the time and temperature required in the dyeing cycle. A cam follower rides on the outer edge of this cam and positions the control index pointer in the second instrument, which is the true controller and which opens or closes the control valves in accordance with the shape of the cam. There are not many applications in textile dyeing where such unvarying repetition is required; but the instrument has many applications where fixed schedules are followed in batch-type operations.

Finally we come to the newest instrument for this application. The instrument is the CycleLog controller, so new that it has not yet had time to become widely familiar. Basically it is a recording elapsed time-temperature controller of the deferred action type, retaining all the infinite flexibility of such instruments, but with an added and very important feature. This is control of the *rate* of temperature rise.



CycleLog Controller for Time, Temperature, and Rate of Temperature Rise, for Dye Kettles.

The importance of bringing the dye bath up to the correct dyeing temperature at a uniform and controlled rate of rise has long been recognized. But until the development of the CycleLog controller there was no satisfactory instrument for doing this, excepting by a cam type mechanism which, as we have seen, has no flexibility. It is not adjustable at will except by substituting one cam for another.

Some five or six years ago our company developed a camless type instrument especially for the piece dyeing of woolen and worsted fabrics in which the control of rate of temperature rise is perhaps most important in all kinds of textile dyeing. The instruments which were made and placed in mills for experimental use and study fulfilled their purpose admirably, but were too intricate in the setting adjustments they required.

A complete new study was made of dyeing practices and requirements: the trend toward lower dyeing temperatures, the length of time involved in various dyeing cycles, and the maximum and minimum rates that might be required to bring the dye liquor up to the proper dyeing temperature. The fact was noted that the water entering the dye tub might vary in temperature, from as low as 40° in the winter to 70 or 80° in the summer time. With such factors to be considered, it was obvious that a cam-type instrument would not meet all requirements, particularly in view of the overall flexibility required, to provide the changes in dyeing cycles, from one batch of material to the next.

Furthermore, our cam-operated instrument was not a sequence controller. It did not recognize different steps in the dye cycle. We wanted these individual steps to be recognized, and now we have accomplished this with the CycleLog controller. For example, the timing mechanism for holding the timing period does not begin operating until the temperature of the dye bath has actually reached dyeing temperature. If there is insufficient steam pressure to bring the dye bath up at the rate set for it, that fact is indicated to the operator by means of a signal light. Signal lamps are also provided which indicate when the kettle is on the rise, or is on the hold, and when the dyeing cycle has been completed.

We have found in general that the temperature of the dye bath is never

brought up more rapidly than at the rate of 8° per minute, or more slowly than 1° per minute; so the CycleLog controller has a rate of rise adjustment that can be set as desired, between 0 and 8° per minute. Likewise, we have learned through long experience that the holding period never exceeds three hours; so the elapsed time adjustment can be set for any desired period of time, from one minute up to three hours. With the CycleLog controller an operator is now able to set up any desired dyeing cycle, for completely automatic control. He doesn't have to be an expert dyer. He merely has to adjust four setting knobs on the instrument panel, according to the instructions given him. That is all the labor required; and the time involved is a matter of a few seconds. To accomplish this result, all in one instrument, is indeed, a noteworthy achievement in our progress—our endeavor to save time and save labor in textile dyeing, with insured uniformity of quality and maximum production.

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Printing in Germany—

(Concluded from Page P222)

plant had almost ceased using the photographic method for this reason and was obtaining really excellent results by the use of quarter tones—half tones and stippling. A lot of study was given to the design and colorings and when one or more colors would prevail throughout the whole set of colorings, separate rollers would be made, rather than resort to fall ons. In this way every coloring would look well.

This same method of segregating certain colors has also been used successfully in photo engraving. Naturally these methods are slow and expensive but do result in excellent colorings.

DISCUSSION

Question: Were they using back greys in the printing?

Answer: Yes, entirely. No blanket washers were used.

Question: Did they have a shortage of gums in Germany?

Answer: Yes they had a shortage of gums like starches, but they seemed to make it up with the industrial gum.

Question: What is the industrial gum?

Answer: It is the sweepings of gum senegal which is cooked under pressure, clarified and dried out under heated cylinders.

Question: What are Coloresines?

Answer: There is a whole series of them. They are basically cellulose. They did not favor using them.

Question: Were these used in vat printing too?

Answer: Yes.

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OFFICERS, PHILADELPHIA SECTION

PROF. PERCIVAL THEEL has been elected to serve as a councilor of the Philadelphia Section for the balance of the year. W. R. Smith and James Dixon have been appointed members of the Sectional Committee.

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MEMBERSHIPS FOR STUDENTS

THE Rhode Island Section, winner of first prize for the last two years in the Intersectional Contest, is using a limited amount of the prize money for this year for use as prizes covering student membership in the A.A.T.C.C. for students in local textile schools. It was felt that this would stimulate interest in the Association among students and it is reported that results have been very gratifying.

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FLAMMABILITY COMMITTEE

Report to General Research Committee Meeting, April 5, 1946

Dr. H. E. Hager, Chairman

AT the Victory Convention General Research Meeting, Jan. 5, 1946, it was pointed out that we believed we would soon overcome the last difficulties in our testing method regarding controlling the humidity and surface conditions of test samples. We have since then made numerous tests in three laboratories by conditioning samples in desiccators over Magnesium Chloride ($MgCl_2 \cdot 6H_2O$), which proved definitely unreliable, whereas drying at 105° C. for 15 minutes gave considerably better results. We have also made operator group trials with the rotary carding brush which had been devised in order to obtain uniform surface results. However, this brush proved unsatisfactory. It was found that each operator would apply the brush in a different manner with varying degrees of severity causing in that way different degrees of lifting of pile. It became apparent that the brushing operation just like the tester had to be mechanized. After many trials a simple completely mechanical combing device was constructed. When this was tried by five different operators on different samples in a New York Laboratory and showed satisfactory correlation, we asked U. S. Testing Company to construct six identical machines which were shipped to six different laboratories. At the same time, we shipped to each Laboratory four different fabrics cut from the same pieces and detailed working instructions. The test results of these seven laboratories were recently received and showed on the whole satisfactory correlation. We were therefore in a position to set up our final testing method.

It has been submitted to the Executive Committee on Research as our Tentative Test Procedure and meanwhile adopted. We asked Dr. Olney to apply to the Standards Division of the National Bureau of Standards for a Commercial Standard of our method and received Mr. Ehrman's assurance of their cooperation to develop and promulgate such a standard. We have also notified Dr. Walter Scott, Chairman of Subcommittee B-4 of A.S.T.M. of our method and expect it to be adopted by this group.

Furthermore, we have set up a bill with the help of attorneys of N.R.D.G.A., and others which was to be submitted to Representative LeRoy Johnson of Federal Congress. While this was being worked out, Representative Johnson on February 11th, introduced in Congress Bill H.R. 5445 submitted to him by Dr. Ingberg of National Bureau of Standards which was thought by us to be unsatisfactory. This method uses a horizontal tester which had been demonstrated to our Committee on October 5, by Dr. Sandholzer and had then failed to impress us as to its suitability. After our committee was notified about this bill, arrangements were made for a joint demonstration of our A.A.T.C.C. Tester versus the horizontal tester on different samples at N. B. S. in Washington. This demonstration which was attended by three of our committee members on February 21, proved the horizontal tester to be not reliable. Representative Johnson was correspondingly informed and our bill will, after a few minor points are cleared up, be submitted to him.

This proposed bill will be based on the then effective Commercial Standard promulgated by the Secretary of Commerce. It will condemn as dangerous such fabrics and wearing apparel, which when worn by persons will burn, flash, or spread a flame in less time than specified in the Commercial Standard. The bill will require manufacturers, converters or finishers to certify to purchasers that critical fabrics have been tested and are not flammable. The bill will be enforced by the Federal Security Agency or by the Federal Trade Commission.

It is expected that Representative Johnson will turn this bill over to the Interstate Commerce Commission, that they will speedily pass it and that it then will will become a law.

Operating Instructions and Test Procedure for

A. A. T. C. C. FLAMMABILITY TESTER

Tentative Test Method

SCOPE

The object of this test procedure and the Flammability Tester is to evaluate textile materials for flammability characteristics by measurement of rate of burning.

I. TEST APPARATUS (DESCRIPTION OF FLAMMABILITY TESTER)

A. Draft proof chamber with adjustable top.
   1. This metal chamber prevents air circulation around the specimen rack and flame, but permits free ventilation for rapid oxidation.
   2. The top is adjustable and removable.

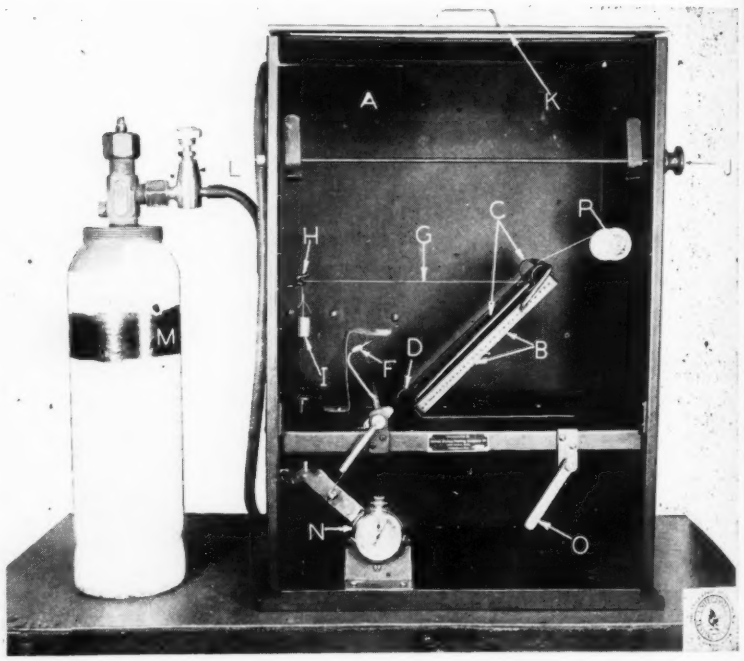
B. The specimen rack is fixed at an angle of 45° and consists of a 4″ x 7″ framework strung with heat transmitting wire laced horizontally.

C. Specimen shield.
   1. This shield, controlled by a hand lever, covers all but 1½″ of the width of the test specimen for the full length.
   2. Shield is raised for the insertion of test specimens and must be brought to bear on the sample face before the start of the test.

D. Indicating Finger.
   1. The forepart of this finger rests on the wire lacings when the sample rack is brought all the way forward.
   2. By means of this finger, the thickness of the sample is compensated for in the throw of the gas nozzle.

E. Control Knobs (Not Shown)
   1. There are two of these knobs which hold the rack in test position.
   2. The knobs can be reached under the stage of the cabinet and permit forward and backward movement of the rack when loosened.

F. Gas Nozzle.
   1. The gas jet consists of a 36 gauge hypodermic needle protected by a copper shield formed around it.



Flammability Tester

G. Stop Cord
   1. This cord stretched from the spool "P" down over the top of the rack and through the loops in the shield and across to the stop mechanism measures the vertical height of the flame.

H. Pulley or Eye
   1. Support and guide for stop cord.

I. Stop Weight
   1. The weight attached by means of a clip to the stop cord, in dropping, actuates the stop motion.

J. Slide Door Control
   1. This knob moves the catch mechanism used to hold the sliding door (not shown in actual position) in an open condition for insertion of test specimens.

K. Slide Door
   1. A glass door (shown in end view) in its normal position slides in the grooves at the front of the cabinet.

L. Fuel Control Valve
   1. Consists of a sensitive control device for regulating the fuel supply at the tank.
   2. The valve ends in a ½″ female connection for attachment to the standard Butane tank of two pounds capacity.
   3. A flow meter (not shown) is used to bring the fuel supply to test level by means of the control valve.
   4. The flow meter consists of a U shaped glass tube cut into the gas line in a manner to register the gas pressure delivered to the micro burner. Attached to the case wall behind the flow meter is a movable metal plate with two (2) parallel horizontal lines one (1) inch apart. When the

pressure is off, the plate is so regulated that the liquid level in both sides of the U shaped tube meets the lower line. When the test is made the pressure is so adjusted that the highest liquid level in the U shaped tube meets the upper line.

M. cp Butane Container
1. This fuel supply, which is not furnished as part of the test equipment, is a No. 4 cylinder of cp Butane.

N. Stop Watch and Timing Mechanism
1. This watch, by means of special attachments, is actuated to a start by connection with the gas jet "F."
2. A driving mechanism on rear of cabinet (not shown) moves the gas jet to its most forward position and automatically starts the timing at the moment of flame impact.
3. The falling weight, "I" when caused to move by severance of Cord "G" stops the watch.
4. Timing is read directly.

O. Starting Lever
1. This lever is operated from left to right in one stroke and is released to operate the gas jet.

P. Cord Supply.
1. This supply, consisting of a spool of No. 50's mercerized cotton sewing thread, is fastened to the side of the chamber and can be withdrawn by releasing the thumb screw holding same in position.

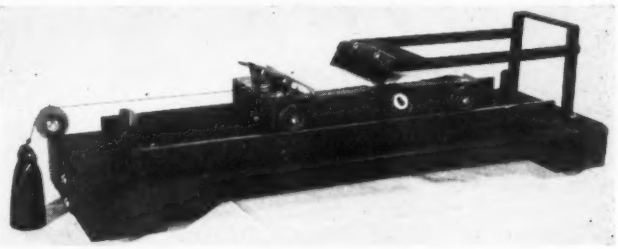
Q. Cord Loop
1. At a point behind "G" on the rear panel, there is installed another loop (not shown in cut) to draw the cord away from directly over the flame.

R. Draft Ventilator Strip
1. A draft ventilator strip (not shown in cut) is placed across the front opening, sealing the space between the sliding door when in lowered position and the base on which the grid rack is attached.

II. DESCRIPTION OF COMBING DEVICE

As shown in the photograph, this apparatus consists of a base board over which a smaller carriage is drawn by means of a counter weight. This carriage runs on parallel tracks attached to the edges of the upper surface of the base board. The comb is hinged with pin hinges at the rear edge of the base board and rests on the carriage with a pressure of 200 grams.

After the sample has been put in place



Combing Device

on the carriage and fastened by means of the clip, the comb is raised, the carriage pushed to the rear, the comb lowered to the face of the sample. The carriage is then released and is drawn forward by means of the 228 gram weight attached to the front end of the carriage by a cord. This cord runs over a grooved pulley as a guide and allows for free running of the carriage.

III. PRE TESTING OF FABRICS

A piece of the material in question (2" x 6") is combed, dried, dessicated, combing and tested on the apparatus to determine if said fabric is flammable. If the fabric does not burn, or burns very slowly, a piece of fabric large enough for the required number of tests is washed by the following procedure.

IV. WASHING PROCEDURE

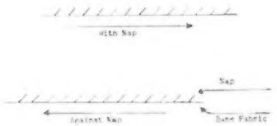
Make up a bath containing 0.5% neutral chip soap, volume of bath 30 times the weight of material. Warm the bath to 95° to 100° F., immerse the material and work gently by hand for 5 minutes. Rinse twice in clear water at 80° to 85° F., extract and dry.

The fabric is then tested by the regular procedure. This washing procedure should remove most of the water soluble fire retardant finishes.

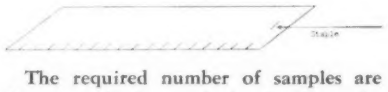
V. PREPARATION OF SAMPLES

The direction of the nap face is first determined on receipt of fabrics for test.

Terms used:



Mark out on the fabric back, the size of the samples (2" x 6") to be used. Mark the individual sample before cutting with a staple as shown by the following sketch.



The required number of samples are then cut. Each sample is placed on the combing device carriage and drawn under the comb once against the lay of the napped face surface. The samples are then placed in an oven at 105° C. for 15 minutes, removed and desiccated over calcium chloride for 5 minutes.

Individual samples are then removed from the desiccator, placed on the combing carriage and drawn under the comb once in the direction of the lay of the napped face surface. The samples are then placed on the grid on the flammability testing device and tested according to the regular procedure as follows:

VI. DIRECTION FOR USE

A. The control valve from the fuel supply is opened and adjusted to the test level. Some time has to be allowed in order to drive the air from the fuel lines. This interval should be approximately five minutes. A flame is then applied to the gas nozzle in its starting position. The sample rack with the test specimen in place (stapled end at top of Grid) is brought forward to the point where the indicating finger touches the face of the sample and is then locked. The shield over the test specimen should be in place when this adjustment is made.

B. The cord is strung through the loops in the shield, across the top of the sample, through the loop on the rear panel and over the guide ring and then the weight is hooked in place close to and just below the guide.

C. The stop watch should be set at zero at the start of each test.

D. The slide door should be in close position at the start of the test.

E. Bringing the starting lever over to the extreme right and releasing it will start the timing mechanism that supplies the gas jet to the face of the fabric.

F. Timing is automatically recorded by the watch, starting upon application of the flame, and ending with the cord burning through at the end when the flames reach the cord line which is horizontal to the top of the sample.

G. Tests should be conducted in a draft-free room.

VII. SUGGESTED INTERPRETATION OF TEST RESULTS

The results of tests on the five samples are averaged. If the average figure is six seconds or higher, the fabric may be considered not dangerously flammable. If lower, the fabric may be considered flammable and unsafe when worn by persons. No individual sample shall show a flammability rate less than five seconds. If failure occurs on any count, indicating the critical nature of the material, a retest is to be made on five additional samples; and if the material is to be declared acceptable, the average of the entire ten samples is to be six seconds or higher and no individual specimen of the second lot of five is to be below five seconds.

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MEETING, PHILADELPHIA SECTION

THE meeting of the Philadelphia section was held on Friday, April 12, in the Clover Room at the Bellevue-Stratford Hotel.

Mr. Baeringer introduced the speaker of the evening, Henry E. Millson and his associates, Willard H. Watkins and George L. Royer. The subject of the evening was "Microscopical Observations of Wool Dyeing—Part V—Study of Crocking." The talk was received with much enthusiasm.

There were 152 present for dinner and 170 present for the meeting.

Respectfully submitted,
A. E. Raimo, Secretary.

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MEMBERSHIP APPLICATIONS

SENIOR

Richard Standish—Dyer, Oregon Worsted Corp., Portland, Oregon. Sponsors: H. B. Fenn, Jr., T. M. Marshall.

Charles F. Stokes — Technician, Carbic Color & Chemical Co., New York, N. Y. Sponsors: E. A. Lutz, C. G. Lederer.

Joseph H. Trepagnier — Chemist, E. I. duPont de Nemours & Co., Inc., Wilmington, Del. Sponsors: C. A. Sylvester, C. A. Seibert.

Joseph H. Troutman—Supt. of Dyeing, Statesville Cotton Mills, Statesville, N. C. Sponsors: H. M. Sprock, L. G. Atkins.

Vernon G. Volland—Sales Engr., Interchemical Corp., Newark, N. J. Sponsors: J. R. Redmond, W. W. Chase.

Herman Weiland—Chemist, Colloids, Inc., Newark, N. J. Sponsors: A. Malick, T. F. O'Brien, Jr.

George W. Wernz—Textile Chemist, A. M. Teaney Associates, New York, N. Y. Sponsors: H. M. Smith, H. G. Scull.

Harry J. Winslow — Dyer, Forstmann Woolen Co., Garfield, N. J. Sponsors: W. von Bergen, E. H. Metzner.

Dwight A. Zink—Dyer, Baxter, Kelly & Faust, Philadelphia, Pa. Sponsors: R. Robertson, G. N. Bond, Jr.

JUNIOR

Mark N. Curgan—Chemist, Lawrence Print Works, Lawrence, Mass. Sponsors: J. Dahle, A. C. Merrill, Jr.

Peter De Mallie—Lowell, Mass. Sponsors: H. C. Chapin, C. L. Daley.

Alvaro Gonzalez — Dyer, Textiles Panamericanos, Medellin, Colombia. Sponsors: W. C. Lindsly, T. J. Dwyer.

Thomas X. Johnidis—Asst. Textile Colorist, Allied Chemical & Dye Corp., New York, N. Y. Sponsors: J. E. Loughlin, G. P. Viegelmann.

Hugo T. Junghenn—Colorist, Berkshire Knitting Mills, Reading, Pa. Sponsors: H. L. De Turck, D. P. Ketner.

Edmund S. Lamont—Tech. Repres., Merrimac Div., Monsanto Chemical Co., Everett, Mass. Sponsors: J. J. McCarthy, S. Smith, III.

William Perlman — Chemist, Freydberg Bros., Strauss, Inc., Stamford, Conn. Sponsor: D. K. Alpern.

Rudolph St. Pierre—Lab. Asst., Lawrence Print Works, Inc., Lawrence, Mass. Sponsors: J. Dahle, A. C. Merrill, Jr.

Ruth de C. Schlau — Chemist, Eastman Kodak Co., Rochester, N. Y. Sponsors: H. M. Smith, H. G. Scull.

Owen O. Scott, Jr. — Supt. of Dyeing, Union Mfg. Co., Union Point, Ga. Sponsors: A. K. Haynes, J. W. Swiney.

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John M. Pharr—North Carolina State College, Releigh, N. C. Sponsor: A. H. Grimshaw.

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ONE HUNDRED AND FORTY-FIFTH AND FORTY-SIXTH MEETINGS OF THE RESEARCH COMMITTEE

THE 145th meeting of the Research Committee, on January 5, 1946, was open to all attending the General Meeting in New York, and was devoted to a review of the accomplishments and plans of the Committee.

The 146th meeting followed the Council meeting in New York on Friday, April 5, 1946. Present were Chairman Louis A. Olney presiding, W. D. Appel, S. Backer, H. D. Barker, K. H. Barnard, G. L. Baxter, E. A. Berger, E. C. Bertolet, J. R. Bonnar, F. Bonnet, W. W. Chase, H. D. Clayton, W. E. Coughlin, C. W. Dorn, C. Z. Draves, A. W. Etchells, A. R. Fletcher, E. Freedman, W. B. Griffin, H. E. Hager, W. J. Hamburger, J. V. Harvey, S. L. Hayes, W. A. Holst, N. A. Johnson, A. J. Kellner, H. V. King, D. P. Knowland, G. O. Linberg, E. D. Lind, L. S. Little, A. R. Macormac, J. E. Meili, C. Monego, W. R. Moorhouse, A. D. Nute, J. Redmond, R. E. Rupp, B. A. Ryberg, C. H. A. Schmitt, C. A. Seibert, G. A. Slowinske, J. A. Stevenson, H. W. Stiegler, P. Theel, F. R. Tripp, J. F. Warner, H. E. Wilde, P. J. Wood, and H. C. Chapin, Secretary.

The Chairman reported the starting of a research on comparative values of sodium chloride and sodium sulfate in dyebaths, financed by the International Salt Co. and directed by Professors Neville and Ewing at Lehigh University. He requested that all reports for the 1946 Year Book be in by May first; also that a report be submitted following every subcommittee meeting, marked whether or not for publication. Dr. Stiegler reported progress in Lowell on the machine for detergency tests, on water repellency and perspiration tests, and on dimensional changes in rayon and cotton fabrics.

Dr. Barker reported that in the war emergency mildew tests under development by his committee had been put to practical use faster than they could be formally presented. They were about ready for publication and acceptance as standard methods. Mr. Kellner reported that for estimation of damage by moths and carpet beetles visual examination had been adopted by his committee. Work of the Philadelphia Quartermaster Depot with photographs in three dimensions was cited as a further contribution to this method.

Reporting for the Committee on Wash Fastness, Mr. Dorn showed two new metal jars with corrugated sides, designed to bring wash fastness and shrinkage tests into closer resemblance to actual laundering. Rayon samples were about ready for tests in launderies. Mr. Knowland and Mr. Holst, reporting for the Committee on Transference of Color, again requested consideration of the Color Transfer Chart by other committees in their tests.

It was announced that the Committee on Dimensional Changes in Textile Fabrics would be expanded into committees dealing with various fabrics, under a steering committee headed by Dr. Coughlin. The Committee on Water Repellency, Mr. Slowinske reported, was assembling samples for further experiments in Lowell in correlation of tests with actual rain. Meanwhile the National Bureau of Standards was studying the fundamental scientific factors involved. On behalf of his committee, Dr. Meili offered a control dye and a method of testing fastness to pleating. There was discussion of phototropic dyeings, changing temporarily in hue under variations in light exposure. Mr. Seibert reported for the Committee on Fastness to Light, and Professor Theel for the Committee on Analytical Methods.

Dr. Hager reported that the Flammability Test, accepted by the Research Committee and Council as a tentative method, was to be offered to the National Bureau of Standards for acceptance as a Trade Standard and as a basis for National legislation. Earlier problems had been solved by a combing device for raising the pile on fabrics, and by a preliminary drying for 15 minutes at 105 degrees centigrade. Mr. Redmond reported progress on tests for fire resistance of duck, loaded to extent of 20-25 per cent and 30-35 per cent, respectively.

Respectfully submitted,
HAROLD C. CHAPIN,
Secretary

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MEETING, SOUTH CENTRAL SECTION

THE Spring meeting of the South Central Section was held at the Patton Hotel in Chattanooga, Tennessee, Saturday, April 13, 1946. There were 120 members and friends in attendance.

After a short business session an Information Forum was conducted. Technical questions relating to dyeing and finishing operations were asked and answered. After the Information Forum, a reception and banquet followed.

Section officers are Clyde J. Horne of Dixie Mercerizing Company, Chairman; W. K. Newman, Peerless Woolen Mills, vice President; A. J. Nelson, Springfield Woolen Mills, secretary, and Ben Borrman, Central Franklin Process Company, treasurer. Mr. Horne announced that the sectional executive committee is composed of these officers and, in addition, A. J. Kelly, Burkart-Schier Chemical Company; J. A. Crumley, Hosiery Processing Company; Fletcher Kibler, United Hosiery Mills, and J. D. Mosheim, Chrystal Springs Bleachery.

The next meeting was tentatively set for September 21, at the Patton Hotel, Chattanooga.

Respectfully submitted,
A. J. NELSON,
Secretary

CALENDAR OF COMING EVENTS

NORTHERN NEW ENGLAND SECTION:
Meeting: May 17.
Outing: June 7

RHODE ISLAND SECTION:
Outing: June 14.
(Pawtucket Golf Club, Pawtucket, R. I.)

PHILADELPHIA SECTION:
Meeting: May 24.

MID-WEST SECTION:
Outing: June 22
(Lake Lawn, Delavan, Wis.)

SOUTH CENTRAL SECTION:
Meeting (Tentative): September 21
(Patton Hotel, Chattanooga, Tenn.)

SUB-COMMITTEES:
Meetings: June 13
(Hotel Commodore, New York City.)

COUNCIL:
Meeting: June 14
(Hotel Commodore, New York City.)

RESEARCH COMMITTEE:
Meeting: June 14
(Hotel Commodore, New York City.)

NATIONAL CONVENTION:
Silver Jubilee Convention: December 12, 13 and 14.
(Hotel Statler, Boston, Mass.)

Rotproofed Cordage—

(Continued from Page 218)

ing the "original" breaking strength measurements were soaked in water and dried before breaking, to compensate for shrinkage due to wetting occurring in the exposed samples. All samples were conditioned at 65 per cent relative humidity and 70° F. for 48 hours before breaking.

Determinations of copper content were carried out as previously described (6). Contents of wax and pine tar were determined by Soxhlet extraction using successive extractions with petroleum ether and benzene.

Data

Data for weather conditions during the exposure periods are given in Table I and breaking strength data in Table II, the losses in breaking strength being calculated on the basis of the strengths of the treated samples. It will be noted that the laboratory treatment with copper naphthenate slightly increased the strength of the cordage. The other laboratory treatments (viz. copper oleate and pine tar) appeared to produce no marked change in strength.

With respect to the effect of exposure on the untreated samples, manila, sisal and "wartime" showed losses in breaking strength of the order of 31 to 36 per cent, the manila being slightly, but probably not significantly, higher than the others. The losses for cotton and hemp were considerably lower being 21 and 22 per cent respectively. It should be recalled that the diameter of the cotton cordage was less than that of the other samples and this would be expected to increase somewhat the relative rate of degradation of the cotton sample. In spite of this, the degradation of the hard fiber samples (⅜ inch diameter) was greater than hemp (⅜ inch diameter) or cotton (¼ inch diameter). It may therefore be concluded that cotton and hemp are less prone to actinic degradation than are hard fibers (manila, sisal and "wartime"). It may also be concluded that cotton cordage equal in diameter to the hemp sample and having the same degree of twist would have shown a somewhat lower extent of actinic degradation than was the case with the hemp.

Comparing the breaking strength losses shown by the samples containing copper naphthenate and copper oleate, the cotton sample containing the latter compound showed an appreciably lower loss but with the other fibers there was no significant difference—the samples containing copper naphthenate and wax showed substantially lower breaking strength losses than the samples containing no wax. It will be noted that in almost all cases the losses in breaking strength shown by the untreated samples were greater than those shown by the treated samples, the few exceptions giving similar losses for both untreated and treated. The data for effect of weathering on copper losses are given in Table III. It will be seen that in the samples containing copper naphthenate and copper oleate alone, there were substantial losses of copper. The data emphasize the highly beneficial effect of wax in suppressing the loss of copper and confirm the results of a recently-completed investigation covering the effect of weathering on cotton duck containing copper compounds in the presence and absence of waterproofing wax (5).

TABLE I
Weather Data

Period	Mean Daily Temp. ° F. Max.	Min.	Rainfall Inches	Sunshine Total Hours
July 10-July 16, 1944	82	59	0.53	56.6
July 17-July 23, 1944	78	52	1.09	69.8
July 24-July 30, 1944	81	62	0.74	45.8
July 31-Aug. 6, 1944	88	63	0.	77.6
Aug. 7-Aug. 13, 1944	90	57	0.	80.0
Aug. 14-Aug. 20, 1944	85	59	0.25	62.9
Aug. 21-Aug. 27, 1944	76	51	0.20	61.8
Aug. 28-Sept. 3, 1944	77	56	0.60	45.4
Sept. 4-Sept. 10, 1944	70	50	0.33	39.6
Sept. 11-Sept. 17, 1944	78	55	0.74	32.6
Sept. 18-Sept. 24, 1944	69	49	0.87	37.9
Sept. 25-Oct. 1, 1944	55	43	1.80	32.3
Oct. 2-Oct. 10, 1944	60	41	0.58	33.1
Apr. 10-Apr. 15, 1945	67	42	0.	50.4
Apr. 16-Apr. 22, 1945	52	32	0.22	41.5
Apr. 23-Apr. 29, 1945	50	37	2.53	13.0
Apr. 30-May 6, 1945	55	38	1.32	20.9
May 7-May 13, 1945	54	35	0.54	31.8
May 14-May 20, 1945	58	41	2.32	28.8
May 21-May 27, 1945	68	45	0.14	49.8
May 28-June 3, 1945	58	40	1.07	50.6
June 4-June 10, 1945	66	43	1.00	52.0
June 11-June 17, 1945	77	58	1.17	48.7
June 18-June 24, 1945	75	55	0.32	55.3
June 25-July 1, 1945	83	59	0.64	67.7
July 2-July 8, 1945	77	57	0.10	76.4
July 9-July 15, 1945	73	55	2.29	38.1
July 16-July 22, 1945	80	57	0.21	63.?
July 23-July 29, 1945	80	60	0.13	64.3
July 30-Aug. 5, 1945	80	57	1.10	59.6
Aug. 6-Aug. 10, 1945	80	55	0.45	42.4
Av.	72	50		
Total			23.28	1530.0

TABLE II
Effect of Exposure on Breaking Strength

Sample No.	Fiber	Treatment	Cu Content (%)	Breaking Strength (lbs.) Original	Exposed	Breaking Strength Loss (%)
1	Cotton*	Untreated	...	667	520	22.1
2	Cotton*	Copper Naphthenate	0.11	715	579	19.0
3	Cotton*	Copper Naphthenate	0.52	722	576	20.2
4	Cotton*	Copper Oleate	0.10	643	597	7.2
5	Cotton*	Copper Oleate	0.55	619	541	12.6
6	Cotton	Copper Naphthenate + wax	0.57	1446	1274	11.9
7	Hemp	Untreated	...	1284	1021	20.5
8	Hemp	Copper Naphthenate	0.079	1377	1213	11.9
9	Hemp	Copper Naphthenate	0.40	1339	1195	10.7
10	Hemp	Copper Oleate	0.093	1349	1177	12.7
11	Hemp	Copper Oleate	0.43	1359	1091	19.7
12	Hemp	Pine Tar	...	1305	1109	15.0
13	Manila	Untreated	...	1646	1047	36.4
14	Manila	Copper Naphthenate	0.081	1651	1202	27.2
15	Manila	Copper Naphthenate	0.40	1702	1323	22.2
16	Manila	Copper Oleate	0.084	1708	1129	33.9
17	Manila	Copper Oleate	0.40	1603	1201	25.1
18	Manila	Pine Tar	...	1626	1326	18.5
19	Manila	Copper Naphthenate + wax	0.31	1491	1252	16.1
20	Manila	Copper Naphthenate + lead soap	0.54	1331	1061	20.3
21	Sisal	Untreated	...	1083	742	31.5
22	Sisal	Copper Naphthenate	0.087	1160	909	21.7
23	Sisal	Copper Naphthenate	0.49	1216	861	29.2
24	Sisal	Copper Oleate	0.10	1193	859	28.0
25	Sisal	Copper Oleate	0.51	1073	769	28.4
26	Sisal	Pine Tar	...	1069	910	14.9
27	Sisal	Copper Naphthenate + wax	...	935	814	13.0
28	Sisal	Copper Naphthenate + lead soap	0.79	1354	1186	12.4
29	Wartime	Untreated	...	1425	984	31.0
30	Wartime	Copper Naphthenate	0.097	1520	1067	29.8
31	Wartime	Copper Naphthenate	0.48	1491	1140	23.5
32	Wartime	Copper Oleate	0.10	1399	1063	24.0
33	Wartime	Copper Oleate	0.47	1335	934	30.0
34	Wartime	Pine Tar	...	1466	1161	20.8
35	Wartime	Copper Naphthenate + wax	0.47	1522	1225	19.5
36	Wartime	Copper Naphthenate + lead soap	0.79	1341	962	28.3

* ¼ inch diameter.

TABLE III
Effect of Exposure on Copper Content

Sample No.	Fiber	Treatment	Copper Content (%) Original	Exposed	Copper Loss (%)
2	Cotton	Copper Naphthenate	0.11	0.06	45.5
3	Cotton	Copper Naphthenate	0.52	0.37	28.9
4	Cotton	Copper Oleate	0.10	0.05	50.0
5	Cotton	Copper Oleate	0.55	0.26	52.7
6	Cotton	Copper Naphthenate + wax	0.57	0.54	5.3
8	Hemp	Copper Naphthenate	0.08	0.05	37.5
9	Hemp	Copper Naphthenate	0.40	0.37	7.5
10	Hemp	Copper Oleate	0.09	0.08	11.1
11	Hemp	Copper Oleate	0.43	0.42	2.3
14	Manila	Copper Naphthenate	0.08	0.06	25.0
15	Manila	Copper Naphthenate	0.40	0.32	20.0
16	Manila	Copper Oleate	0.08	0.07	12.5
17	Manila	Copper Oleate	0.40	0.29	27.5
19	Manila	Copper Naphthenate + wax	0.31	0.28	9.7
20	Manila	Copper Naphthenate + lead soap	0.54	0.50	7.4
22	Sisal	Copper Naphthenate	0.09	0.05	44.4
23	Sisal	Copper Naphthenate	0.49	0.25	51.1
24	Sisal	Copper Oleate	0.10	0.06	40.0
25	Sisal	Copper Oleate	0.51	0.42	17.6
28	Sisal	Copper Naphthenate + lead soap	0.79	0.73	7.6
30	Wartime	Copper Naphthenate	0.10	0.07	24.8
31	Wartime	Copper Naphthenate	0.48	0.42	12.5
32	Wartime	Copper Oleate	0.10	0.08	20.0
33	Wartime	Copper Oleate	0.47	0.41	12.8
35	Wartime	Copper Naphthenate + wax	0.47	0.44	6.4
36	Wartime	Copper Naphthenate + lead soap	0.79	0.75	5.1

TABLE IV
Effect of Exposure on Wax and Pine Tar Content

Sample No.	Fiber	Treatment	Extractable Matter (%) Original	Exposed	Decrease in Extractable Matter (%)
6	Cotton	Copper Naphthenate + wax	15.3	13.9	9.2
12	Hemp	Pine Tar	17.8	14.9	16.3
18	Manila	Pine Tar	20.0	16.1	19.5
19	Manila	Copper Naphthenate + wax	19.1	15.0	21.5
26	Sisal	Pine Tar	26.2	18.4	29.8
27	Sisal	Copper Naphthenate + wax	20.6	15.9	22.8
34	Wartime	Pine Tar	23.4	16.8	28.2
35	Wartime	Copper Naphthenate + wax	20.2	16.1	20.3

The data for loss of solvent-extractable material in the case of the samples treated with pine tar and with the wax-copper naphthenate preparation are given in Table IV. Weathering produced moderate losses of both compounds, the loss being least with cotton.

CONCLUSIONS

The presence of copper naphthenate and copper oleate in amounts of the order of 0.1 and 0.5 per cent copper does not result in enhanced actinic degradation of cotton and hard fiber cordage, the extent of actinic degradation as measured by breaking strength loss being actually greater in the absence of these compounds.

In the case of the samples containing copper, the breaking strength losses are approximately the same as with samples treated with pine tar.

Substantial losses of copper occur during weathering but the magnitude of this loss can be greatly reduced by the addition of wax.

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ACKNOWLEDGEMENTS

The authors wish to express their thanks to Nuodex Products of Canada Limited, Leaside, Ontario, for supplying the copper compounds, to Plymouth Cordage Company, Doon Twines Limited, and to Drummondville Cotton Company for supplying the hard fiber, hemp and cotton cordage respectively and to F. W. Baker, Meteorological Observer, Central Experimental Farm, Ottawa, for supplying the meteorological data.

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Shrinkage Control—

(Continued from Page 217)

DISCUSSION OF RESULTS

The experimental results described above indicate that the dye-pick is related to shrinkage control or resin retention, but that the correlations between them are not exactly the same under all conditions of cure. For example, Figure 5 indicates that the correlation for a constant amount of resin applied under different cure conditions gives a different curve (Curve A) than the one for different amounts of resin applied for the same curing conditions (Curve B). However, in the region of most practical interest where the shrinkage is 1.5% or less, the two curves, A and B, of Figure 5 approach each other, making the difference less important. If one has chosen the approximate conditions of application it should be relatively easy to set up a series of experiments to give the necessary correlation curve like A or B in Figure 5, and this curve should apply to a wide enough range of conditions to be important for control work.

The amount of dye pickup depends to some degree on the type of fabric being tested, but one may set up standards in the same way as outlined above for 80 x 80 cotton, for other fabrics by impregnating pieces and curing for different periods of time to obtain different degrees of resin retention. The dye pickup and percentage resin in the cloth after washing should give a reasonably good correlation curve between these two variables.

Studies on rayon were preliminary in nature, but did indicate, as in the case of cotton, that the dye pickup decreased as the percent resin retained increased. The amount of staining was approximately the same as for similarly treated cotton samples.

The dye staining technique may be utilized on colored fabrics. The procedure may differ at each plant depending on available equipment, depth of shade being produced, etc. One method would consist of inserting at regular intervals, depending on the length of the run, white leader cloth of the same fabric construction as that of the colored goods. Colored cloth with a background or other large area of white or pastel shade could be tested as if it were white cloth. The methods should be modified to suit specific conditions.

It is also evident that the dye staining technique should be of interest in testing cure box conditions. A comparison might be made across the width of the cloth, and at intervals along the length of the back and of the face, in order to show up any variation in curing conditions at different sections or times in the cure box. Likewise, for uniform curing conditions the existence of non-uniform dye staining would indicate uneven resin distribution resulting from uneven impregnation.

It is obvious that the dye staining technique provides a quantitative procedure for investigating a number of mill application problems where the Aerotex Resin M-3 type of resin is being

employed. Due to the wider use of these resin finishes, a number of different applications will suggest themselves to the mill man.

* * *

We acknowledge the advice and criticism of Mr. A. D. Nute and Dr. J. E. Lynn and thank the Directors of this laboratory for permission to publish these results.

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ABSTRACTS FROM CONTEMPORARY JOURNALS

THE APPLICATION OF VAT DYES TO VISCOSE RAYON

Journal of the Society of Dyers and Colourists, page 41, Vol. 62, No. 2. February, 1946.

I—Hank Dyeing

S. Burgess

Vat dyes are classified by the manufacturers into strong and weak alkali dyes. The latter are sub-divided into hot- and cold-dyeing types, with alternative methods of dyeing for many dyes of both types. Only dyes which dye and level at the same rate should be mixed.

A simple test is described which takes into account the "strike" (initial appearance of a vat dyeing) and subsequent levelling, if any. By means of this test two tables have been prepared in which the weak alkali and strong alkali vat dyes, respectively, are arranged in the order of their strike indexes. The strike index is indicated by letter and number. By use of such information, in conjunction with tables showing the affinity of vat dyes at various temperatures, the dyer is provided with much of the information he requires with regard to the compatibility or otherwise of vat dyes which he may desire to mix.

Dyeing methods developed from this work and which have given the best results for the bulk dyeing of viscose rayon hanks are summarized. Strong alkali (IN) vat dyes, in presence of a suitable retarding agent, should be commenced at a low temperature (95°F) in order to insure minimum initial exhaustion. The temperature is raised slowly to 150°F and kept there until the dyeing is sufficiently level. Many weak alkali dyes (IW) may be dyed at the maximum temperature throughout inasmuch as the levelling at high temperatures much outweighs any gain from initial low temperature dyeing. The temperature may be as high as 180°F. with certain precautions observed: addition of tannic acid (0.4g. per liter) or sulfite cellulose waste liquor (0.15 per cent solution) to prevent tendering of the yarn; an increased quantity of 70°Tw caustic soda (1.00 cc instead of 0.5 cc per 100 cc) to retard the dye, increase levelling, and preserve the necessary margin of alkalinity. Other weak alkali dyes, because of shade changes or oxidation difficulties are not applied at such high temperatures but control is used as with strong alkali dyes. The maximum temperature will vary with individual dyes.

The cold dyeing (IK) process is not suitable for viscose rayon as it emphasizes variations in the material and adequate levelling cannot take place.

A classification of Soledon and Indigosol dyes according to rate of dyeing, temperature giving maximum affinity, and percentage of salt giving maximum depth, is given.

Fundamental difficulties of applying strong alkali dyes are: speed of exhaustion, giving a poor initial strike, and the subsequent inability to level, i.e., the inability of the dye to migrate from the dark portions to the light portions.

Retarding agents, when successful, increase the cost of dyeing as the result of less complete exhaustion of the dyebath.

The best mechanical conditions for levelling are secured on the rotating roller type of machine with careful dressing of the skeins and additional hand turning.

A discussion of selection of proper dyestuffs for particular shades is included.

II—Cake Dyeing

A. B. Cox

The method found most practicable in using the normal caustic soda-hydrosulfite method included: (1) normal reduction of dye with caustic soda and hydrosulfite; (2) addition of Dispersol VL (2 c.c. per 1.); (3) adding the reduced dye in two equal portions; (4) dyeing for 3—4 hours; (5) a pump pressure of 9—10 lbs.; (6) after adding all the dye at 40°—50°C., raising the dyebath temperature to considerably above normal (to 80°C.); and (7) dyeing without salt. Vat dyes with good redistributive properties within the fiber, as indicated by the strike test, may be applied by this method.

A new pigment padding process was developed. This process comprises circulating through the cake a suspension of an unreduced vat dye containing a dispersing agent, with gradual addition to the suspension of sufficient salt to cause substantially complete deposition of the dye on to or into the cake. Reduction is then carried out in the normal way by adding caustic soda and hydrosulfite to the dyebath. By the use of this method it is possible to reduce at a much lower temperature. The concentrations of dispersing agents and salt vary with the conditions and the particular dye being used. The time of dyeing is determined by the efficiency of the machine. It is not possible with this method to apply all vat dyes evenly but a list of dyes which have given satisfactory results is appended.

A typical example, using the new method, follows: Caledon Blue RCS Paste (5 per cent on the weight of material) was circulated through the viscose rayon cake at 90°—95°C. for 1 hr. in 20 vol. of 1 per cent Dispersol VL solution. Common salt (1.5 per cent on the weight of the material) was then added gradually during a further 1 hr. After cooling to 60°—65°C., caustic soda was added, followed by Formosul and sodium hydrosulfite, in order to reduce the dye. Dyeing was then continued at 60°—65°C. for 2 hr., after which the cakes were well washed, oxidized, etc., in the usual manner for blue vat dyes.

The problem of development is still under investigation. The method will vary according to the dye. Pale to medium shades may be developed satisfactorily with sodium hypochlorite.

RECENT ADVANCES IN WOOL DYEING

The Relation of Dyeing Properties to Dyestuff Constitution

F. Townend and G. G. Simpson, Journal of the Society of Dyers and Colourists, page 47. Vol. 62, No. 2, February, 1946.

It is shown that, in a variety of different types of wool-dyeing problems the choice of the most satisfactory dyes is closely connected with the chemical constitution of the dyes and particularly with the number and nature of their acidic groups. Among the wool-dyeing problems covered in this paper and used as illustrations are: mixtures of chlorinated and normal wool; wool damaged by weathering; and carbonizing faults. The chemical theory of wool dyeing supposes that acid dyes are fixed on wool substantially because of the formation of salts between wool and the dye-

acid. The facts reported in this paper support this theory very completely.

COLORED EFFECTS ON WOOL BY NEW METHODS

Edgar I. Noble, The Textile Journal of Australia, page 433, Vol. XX, No. 9, November 20, 1945.

Various methods of chemically treating wool, so that it resists dyeing in the piece, are discussed. By mixture with untreated wool, tone-in-tone and two-colored effects are thus obtained.

Two methods are declared to be commercially satisfactory as follows: (1) Wool boiled with formaldehyde, "R" salt and sulfuric acid is then baked. It resists dyeing sufficiently for the production of tone-in-tone effects, and the process is cheap enough to represent advantages in comparison with ordinary methods. (2) By mixing chlorinated and normal wools, tone-in-tone and two colored effects, or plain colors, may be produced cheaply from one dyebath by choosing certain dyes and the use of Thiotan RS.

SELECTED REFERENCES RELATING TO THE FIELD OF COLOR SCIENCE

Dorothy Nickerson, Textile Research Journal, page 74. Vol. XVI, No. 2, February, 1946.

This specialized bibliograph is the second in a series which is intended to present a list of books and other primary references in a restricted field which will serve as the basis for the accumulation of a company or personal library. The list has been prepared under the following headings: General References; Color Standards and Color Charts; Color Tests; The Eye; and Periodical Literature, covering recent work unavailable in book form. References connected with dyes, dyeing, and the chemistry and constitution of color will appear in separate lists later.

USE OF CYANAMIDE FOR INCREASING THE FASTNESS OF COLOURINGS ON ACETATE RAYON

Textile Mercury and Argus, page 209, Vol. CXIV, No. 2969, February 15, 1946.

Acetate rayon fabric dyed with an anthraquinone blue can be padded with a 6 per cent solution of cyanamide containing 55 cc of glacial acetic acid and then be dried for 20 minutes at 130°C. The dyed fabric is said to be made fast to the fumes of burning coal gas.

IMPORTANCE OF pH AND GREASE RESIDUE WITHIN THE FIBER

Arthur N. Patterson, The Textile Journal of Australia, page 491, Vol. XX. No. 10, December 20, 1945.

In order to maintain control during a dyeing operation, it is necessary to know the pH of the dyebath during the process, and also to know the pH of the fiber itself before dyeing. Natural conditions which cause an increased affinity of the fiber for dyestuff are the exposure of the fiber to weather, light, or alkali damage. These conditions cause an increase of pH of the fiber. The dyer should have full knowledge of the dyestuff used and also the physical and chemical condition of the wool. Pulled wool is usually treated with a small percentage of acid to neutralize or sour it. Variation in pH concentration in mohair has the same general effect during the dyeing process as in wool. Too high a grease residue will give poor dyeing results. A small amount of dyestuff will combine with the grease residue and will be lost during milling and scouring. High grease residues will often cause color crocking and are objectionable in the finished cloth. The grease residue will cause a decreased rate of color absorption.

TRADE NOTES • NEW PRODUCTS

• MONSANTO PROMOTIONS

Appointment of Paul G. Marsh as assistant production manager of the Organic Chemicals Division of Monsanto Chemical Company, and the promotion of A. J. Pastene to succeed him as manager of the company's John F. Queeny plant in St. Louis, was announced recently by Osborne Bezanson, vice president and divisional general manager.

E. T. Stehlby, formerly manufacturing superintendent, was promoted to the newly-created position of assistant plant manager of the John F. Queeny plant. At the some location, Roy G. Hemminghaus, Walter Meyer and J. W. McCrackin were named manufacturing superintendents.

• 20TH ANNIVERSARY, HATCH LABORATORY

Hatch Textile Research, a commercial textile testing laboratory located on Madison Sq. at 25 E. 26th St., New York, N. Y., was established on May 1, 1926 in the local textile market and on May 1, 1946 celebrated its twentieth anniversary in the business.

They are engaged in the testing and analyses of fabrics, yarns, fibers, hosiery, underwear and outerwear for fabric construction and serviceability and render this service to department stores, specialty shops, chain stores, textile mills, converters, wholesalers, manufacturers, importers, exporters and the Dept. of Markets. Their specialty has been the examination of adjustment disputes arising on merchandise said to give unsatisfactory wear.

Herbert H. Hatch, Director, began his textile career in 1908 in the employ of his father who established himself professionally as a textile expert and adjuster in 1880 on Canal St. in New York City.

Mr. Hatch is a member of Textile Research Institute, Inc., American Society for Testing Materials, American Assn. of Textile Chemists & Colorists and a Charter Member of American Association of Textile Technologists.

• MANAGER, BJORKSTEN BRANCH

Dr. J. Bjorksten announces that Stuart O. Fiedler, Research Associate, has been appointed Manager of the South Chicago Branch of the Bjorksten Laboratories.

Mr. Fiedler obtained his B.S. degree in Chemical Engineering from the University of Wisconsin in 1924. Before joining the Bjorksten Laboratories, he was for several years connected with the Burgess Laboratories, and for fifteen years with the E. I. duPont deNemours and Company, where he was in charge of research groups.

• TRUSTEE, P. T. I. FOUNDATION

Gerome Leonard of the Gerome Leonard Company, New York, has been elected a trustee of The Philadelphia Textile Institute Foundation, it was announced recently by Colonel Millard D. Brown, President of the Foundation.

Mr. Leonard, an alumnus of the Philadelphia Textile Institute '07, has been identified with the merchandising of woolen and worsted fabrics in the New York market for the past thirty-seven years.

• PLASTIC FELT HATS

Something new in men's hats is being offered today in "plastic-felt" hats made of a felt in which wool is combined with "Vinyon" fibers, according to the American Viscose Corporation. This is the first time, it is believed, that a felt containing plastic fibers has been developed for specific use in men's hats.

Several advantages are claimed for the new hats, among which are that they are water-repellent; that they will not lose their shape, because the fibers are permanently "set" by means of a special process; that they cannot shrink, because the material of which they are made will not absorb moisture; and they are considerably lighter in weight than other wool content hats.

One of the principal reasons for using "Vinyon" in the new hats is because it is impervious to water, which it sheds without absorbing, and is as strong when wet as when dry. In making the felt for men's hats, "Vinyon" fibers are fused with the wool fibers and become an integral part of the material, making the finished felt water-repellent.

● **NOPCO TERRITORIAL CHANGES**

Sales territorial changes to provide for expansion of company activities and the return of servicemen in the Textile Specialties Division of the Industrial Sales Department, have just been announced by Thomas A. Printon, vice-president of the National Oil Products Company, Harrison, N. J.

Under the new set-up, Thomas J. Campbell, who returned to the company recently from the armed forces, will cover Long Island, Brooklyn and Queens. Daniel S. Rion, another ex-serviceman, will handle the South Carolina, Georgia and middle Tennessee territory.

Mr. Printon also announced other territorial changes which include Walter E. Brewer, who will cover northeastern Pennsylvania; Frank J. Chadwick, the Borough of Manhattan; Lawrence E. Rossiter, eastern Connecticut, Rhode Island and southeastern Massachusetts; Neil E. Elphick, northern New Jersey and New York State as far north as Saugerties; Thomas D. Wilkinson, central New Jersey and Staten Island; and Alfred M. Hartley, southeastern Pennsylvania, southern New Jersey, Delaware, Maryland and Virginia.

● **JOINS JEFFERSON SALT**

Arthur F. Black, for many years associated with the textile industry, has been chosen to head the new engineering department of Jefferson Island Salt Company, of Louisville, Kentucky.

The engineering department was set up with the view of offering a technical service to textile mills and other industries using salt.

Mr. Black served as district manager of the War Production Board, with headquarters at Charlotte, North Carolina, since 1941. Prior to that he served with E. I. DuPont Co. and the Myles Salt Company.

● **ELECTIONS, GIVAUDAN-DELAWANNA**

At the annual stockholders' meeting held recently in New York City, three new members were elected to the Board of Directors of Givaudan-Delawanna, Inc., manufacturers of organic chemicals, aromatics, and perfume raw materials. The board now consists of Xavier Givaudan, of Geneva, Switzerland; Andre Givaudan, also of Geneva; Dr. Eric C. Kunz, president; Francis N. Bangs, vice-president and counsel; Ralph M. Stevenson, sales manager; Harold F. Duffy, treasurer, and Dr. Max Luthy, production manager. Mr. Stevenson, Mr. Duffy and Dr. Luthy are the new members. At the same meeting, Mr. Duffy was elected treasurer.

The election at this time brings into the Board of Directors the active top management of the corporation.

● **MANAGEMENT CHANGES, COLGATE**

The Colgate-Palmolive-Peet Company announces changes in the management of its Industrial Sales Department.

R. O. Trowbridge

Effective March 15, R. O. Trowbridge, former manager of the Kansas City office of the Industrial Department, will be manager of the industrial activities east of the Mississippi River. Mr. Trowbridge will report directly to James A. Reilly, vice president in charge of Soap Sales in the same territory.

M. M. Stuart, former manager of the Industrial Sales Department and of the Glycerine Department, will devote all of his time to the glycerine activities of the company.

J. C. Speaker, former salesman in the Kansas City District, succeeds Mr. Trowbridge as manager of Industrial Sales in the Kansas City Division, and R. J. Girardet will handle Mr. Speaker's former territory in the Kansas City District.

Mr. Trowbridge has been transferred to Jersey City, N. J., in his new capacity. Mr. Trowbridge went to the Colgate-Palmolive-Peet Company 25 years ago, and spent 18 years on the west coast before being transferred to Kansas City as Divisional Manager January 1, 1938. When he assumes his new post it will mark his 25th anniversary with the company.

● **MATHIESON PILOT PLANT**

In line with its program of expanding production and research facilities, The Mathieson Alkali Works, manufacturer of a number of heavy chemicals and chemical specialties, is about to build a new pilot plant at Niagara Falls, N. Y., according to the company president, George W. Dolan.

The structural steel for the building is on hand and construction will get under way as soon as real estate negotiations are concluded. Expected to cost $150,000, the pilot plant building will be the second recent addition to the company's facilities at Niagara Falls. Completion of another plant in that city, for increased production of sodium chlorite, was announced last September.

● **GERMAN TESTING METHODS**

German textile testing methods and devices developed at the I. G. Farben laboratory at Hoechst, Germany, include special machines to test bursting tensile strength, and abrasion reactions of textiles, according to a report released by the Office of the Publication Board, Department of Commerce.

Among other methods and devices described and pictured in the report are an apparatus for determining the twist a thread must have to possess the greatest strength; and bending devices to determine the stability of fabrics subject to strain from bending, creasing, or crimping.

The two-volume report, prepared by investigators for the Office of the Chief Quartermaster, is obtainable from OPB (PB-5085; 226 pages; photostat, $16.00; microfilm, $2.50). A second report, PB-5086, contains 38 pages of photographs identical with those in the full report (photostat, $3.00; microfilm, 50 cents).

Tests to determine washing qualities, resistance to shrinking, water repellency, water absorption, and air permeability are described in detail.

Much of the testing done at the Hoechst laboratory was qualitative, because of wartime deterioration in the quality of textiles, the investigators reported. In normal times, there was considerable development of quantitative methods and machines at the laboratory, they said.

Directions for construction and operation of the Zeiss-leukometer, an apparatus for measuring the white content of paper, textiles, and cloth, are included in the report.

PB-5085 and PB-5086 may be ordered in Room 1312, Commerce Building, or by mail. Mail orders should be accompanied by check or money order, payable to the Treasurer of the United States, and should be addressed to the Office of the Publication Board, Department of Commerce, Washington 25, D. C.

● **RESIN BOOKLET**

American Cyanamid Company's Textile Resin Department has announced publication of a new textile finishing bulletin, No. 113, "Resins for Textiles."

It describes the uses and application to textiles of thermosetting resins (such as Lanaset resin for wool shrinkage control)

and the urea and melamine resins used for crease resistance and permanent glazing of chintz. Thermoplastic resins and their use and application to textiles are also described.

The bulletin is available upon request to the Textile Resin Department, American Cyanamid Company, Bound Brook, New Jersey.

● **JOINS WARWICK**

Kenneth Glace has joined the Warwick Chemical Company, a division of Sun Chemical Corporation, and has been assigned to the newly opened Philadelphia office at 29 North Sixth Street. Mr. Glace has recently been discharged from the Army with the rank of Lt. Colonel after five years of service with the Quartermaster Corps, two years of which were in North Africa and Italy.

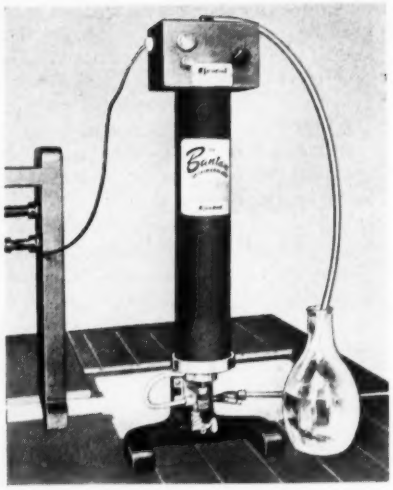
Kenneth Glace

Prior to entering military service Mr. Glace, a graduate chemical engineer from Lehigh University, had extensive experience in the textile industry, serving at one time as chief chemist for the R. K. Laros Silk Company, Bethlehem, Pa.

● **BANTAM DEMINERALIZER**

To meet the needs of laboratories and industries where the amount of de-ionized water required is not great enough to justify lengthy regeneration processes, the Barnstead Still & Sterilizer Co., 2 Lanesville Terrace, Forest Hills, Boston 31, Mass., have just announced their new Bantam Demineralizer. It employs a single renewable cartridge which contains both cation and anion resins which convert the dissolved salts in the water to their corresponding acids, and then chemically absorb these acids. No heat, electricity, or chemicals are employed in the process. Flow-rate is from 5 to 15 gallons per hour.

The manufacturer stresses the extreme simplicity of operation and installation. Only electrical connection necessary is for indicator light which tells when new cartridge is needed. It plugs into any



Barnstead Bantam Demineralizer

ordinary outlet and load is only a fraction of a watt. The Bantam can be connected to water supply by rubber tubing or ¼" pipe. To use it is then only necessary to turn on water supply and collect demineralized water in continuous flow.

It is claimed that one cartridge will remove 400 to 600 grains of ionizable salts. Thus one cartridge will produce up to 300 gallons of demineralized water, depending upon the hardness of the raw water supply. When resistance of effluence drops to 50,000 ohms the indicator lamp goes out, showing that new cartridge is needed. To replace cartridge it is merely necessary to loosen thumb-screw which holds it in place and insert new cartridge.

● **JOINS RUMFORD CHEMICAL**

Two additions to the Research Laboratory Staff of Rumford Chemical Works, Rumford, R. I., have been announced by Albert E. Marshall, President.

John R. Van Wazer, Ph.D., formerly in charge of a Physical Chemistry Laboratory in the Tennessee Eastman Corp. division of the Clinton Engineering Works at Oak Ridge, will serve as a physical chemist. A Phi Beta Kappa graduate of Northwestern University, Evanston, Ill., in 1940 with a Bachelor of Science degree, Dr. Van Wazer received his master's and doctorate degrees in 1941 and 1942 respectively at Harvard University, where he was a University Fellow. He was a research chemist in the Department of Manufacturing Experiments at Eastman Kodak, Rochester, N. Y. from 1942 to 1944.

Robert H. Elliott, M. S., an inorganic chemist for seven years at the Laurel Hill Research Laboratory of the General Chemical Co., Long Island, will hold a similar position at Rumford. A graduate of the University of New Hampshire in 1939 with a Bachelor of Science degree, Mr. Elliott received his master's degree the following year at the University of Vermont, where he held the Eli Lilly Fellowship.

● **TEXTILE EXPOSITION POSTPONED**

The national textile industry exposition scheduled for Los Angeles this fall has been postponed until next year.

According to Frank B. McNeil, chairman of the board of the exposition corporation, the postponement was made at the request of the nation's largest textile manufacturers who had planned to exhibit here during August and September.

● **PLASTIC FILM APPOINTMENT**

William B. Nichols, president of Plastic Film Corporation, announced recently the appointment of Laurence R. Sherman as General Sales Manager. Mr. Sherman has been associated with Plastic Film Corporation for the past year organizing the Sales Department to handle new peace-time products. Since graduating from Yale's Sheffield Scientific School in 1932, he has done research, technical service and sales work with textiles and industrial chemicals.

● **MADE OFFICER IN CHARGE**

Col. B. W. Pelton has assumed duties as Officer in Charge of Headquarters, Quartermaster Inspection Service, New York Office, 111 East 16th Street, it was announced recently. He succeeds Col. Vere Painter, who has been relieved from active duty. The New York Headquarters is the key unit and serves as policy-maker of the nationwide Inspection set-up for QMC contracts.

● **JOINS HEYDEN CHEMICAL**

DeWitt Thompson, formerly associated wtih the Mathieson Alkali Works, has joined the sales staff of Heyden Chemical Corporation. He will cover Maryland, Pennsylvania and Western New York State.

Prior to joining Heyden Chemical Corporation, he served forty-six months in the United States Navy. His rank was that of Commander.

Mr. Thompson is a member of The Chemists' Club and a member and past president of the Salesmen's Association of the American Chemical Industry.

● **BRISTOL BULLETIN**

The Bristol Company, Waterbury 91, Connecticut, has announced a new bulletin, No. pH1302, describing its line of pH Control Instruments.

Bristol Continuous pH Controllers and Recorders are described in detail including electrode assemblies and accessories. The bulletin includes engineering and technical information relative to pH theory and measurement. A variety of actual installations are described; with chart records, photographs, and flow diagrams included.

Copies of the bulletin may be obtained from The Bristol Company.

● JOINS AMERICAN VISCOSE

William P. Crawley has joined the staff of the Textile Research Department of American Viscose Corporation, Marcus Hook, Pa., as a textile engineer in the Industrial Division. Mr. Crawley has just returned from four years' service with the Quartermaster Corps of the U. S. Army, in which he held the rank of major. He is a graduate of North Carolina State College with B. S. and M. S. degrees in textiles, and prior to the war was associated with Burlington Mills Corporation and later with Tennessee Eastman Corporation.

● SUMMER TEXTILE-TESTING COURSE

The refresher course in textiles and testing techniques held yearly in the main laboratories of the United States Testing Company, Inc., Hoboken, N. J., will be repeated this summer. These courses, held over a period of nine years are planned to bring up to date and expand textile studies.

Students receive specific instructions in fiber, fabric and cloth analysis; the origin, identification and nature of natural and man-made fibers such as rayons, casein, Vinyon, nylon, Fiberglas and soybean; the testing of woven and knit fabrics for thread count, fiber identification and composition, tensile strength, seam slippage, color fastness to light, washing and drycleaning. Newly developed equipment such as the yarn shift, warmth, snag, fatigue and friction testers, Weatherometer, fluorophoto-meter, coolness tester, and osmoscope are important parts of the course. Sample swatches of fibers, yarns and fabrics, mimeographed text and special literature are distributed to each student. Emphasis is placed on familiarizing the students with A. S. T. M., United States Government, commercial standards and other specifications. The scope of service tests and their interpretation and use by industry and the consumer is touched upon. Field trips to nearby industrial plants, a synthetic fiber plant, and a textile finishing mill are included in the program.

Classes will be in session from 9 a.m. to 4 p.m. beginning July 8th and extending through July 26th. A small fee is charged to cover the cost of supplies, mimeographed text and samples necessary for the students' laboratory work. The group is limited in number so that each member may have the advantage of individual instruction and the opportunity to work with testing equipment. Applicants are required to have some elementary textile training in order that a major portion of the three weeks may be devoted to intensified study.

Application forms available from the United States Testing Company's main laboratory in Hoboken will be sent on request to representatives of the fields of education, home economics and retailing who are invited to take the course.

● U. S. RUBBER TREATMENT

A textile treatment to give fabrics a permanent "starch" has been announced by the Naugatuck Chemical Division of United States Rubber Company.

Said to be completely invisible on the fabric and unaffected by laundering and dry cleaning, it is claimed that the new textile treatment will give nurses' uniforms, women's summer dresses, sheets and shirts a permanent "starchiness" under all weather conditions. Bed spreads are said to retain their neat appearance longer when made from fabrics treated by this new process. Draperies have improved fold and hang. Curtains appear fresher and dresses retain their newness. The treatment, called Kandarizing, is said to be non-toxic, non-irritating and will not tenderize the finest white broadcloth or more colorful chintz.

The treatment, which makes use of a new synthetic resin, adds only 1½ to 2 per cent to the original weight of the fabric. Applied at the time of manufacture in the form of a water emulsion, the treatment lends itself readily to present textile processing equipment. It requires no cure and is unaffected by bleaching agents. Fabrics are immersed in the emulsion, squeezed and dried at a temperature ranking from 212° to 250° F.

● LOWELL TEXTILE REUNION

The 46th annual reunion of the Lowell Textile Institute Alumni Association is to be held at the Boston City Club, May 18, at 6 P. M. This will be the occasion for the recognition of President Emeritus Chas. H. Eames, and also the introduction of the new president, Kenneth R. Fox, to the alumni. A large gathering is expected as it is the first post-war reunion. It is essential to make reservations with the secretary of the Alumni Association at the Lowell Textile Institute as early as possible.

POSTWAR RESEARCH WORKERS

J. E. BULLARD

WARS have a way of stimulating industrial research. It was after the war of 1870 that Germany did the pioneer work in this field. After 1918 industrial research was expanded to a marked degree in the United States. One of the first steps taken toward reconversion after the end of the war which has not yet been declared ended, was the building of new research laboratories. There is reason to believe that as reconversion proceeds we will have an abundance of excellent, well equipped laboratories, far more and better laboratories than we ever had before and that industries will depend upon research to a much greater degree than ever before.

Not much can be accomplished, even in the very best laboratories, however, without trained research workers. A very large percentage of those who would have been trained during the past four years have had their education interruped while they served in the armed forces. It will require at least another four years before a normal number of research workers can be graduated from our colleges. This means that there is a shortage of such trained men and women equal to the number which, under normal conditions, would have been turned out in eight or ten years. That is equal to that number less the relatively few who have been trained. This situation, however, may not be as tragic as it might appear.

In his presidential address to the Institution of Mechanical Engineers, in London, on October 20, Dr. Harry R. Ricardo, F.R.S., pointed out that the industrial research worker, to be successful, must have a vivid imagination but that experience, sound judgment and common sense are more important than scientific eminence. He gave the impression that, in his opinion, not enough attention has been given in the past to practical experience on the part of research workers. For that reason, perhaps, not as much progress has been made as would have been possible had more attention been given to experience, sound judgment and common sense.

Though he was speaking of conditions in England, what he said probably applies as well to the United States. At least, it may be that theory has been given more attention than experience, sound judg-

ment and common sense. From 1930 to the start of the war, it was none too easy for a college graduate to gain practical experience in industry. If he had a thorough technical training and other requirements for success in research work, however, he might be able to get a job in a laboratory. From 1941 until the drafting of men was reduced, those who possessed the qualifications to become successful research workers were more likely to find themselves in the army or the navy than in class rooms or laboratories. They might be gaining a lot of experience and at least some of this experience might be of value to them in future undertakings but they were not gaining formal education.

The textile industry is no exception, in so far as the need for industrial research is concerned. The dye industry promises to become more and more important as the years pass and an increasing number of problems which will present themselves will not be solved satisfactorily without research. After 1918 came rayon with its dye problems. When the shooting stopped in 1945, nylon as well as rayon were well known by the public and in demand. Just how many more new fibers will be developed for textile purposes in the near future depends a great deal upon the amount of research done. How many of them will be natural fibers and how many synthetic also remains to be seen. Of one thing we can be certain, however, there will be dye problems to be solved in an ever increasing number as new synthetic and natural materials are developed through research for use in the textile industry.

Prospects of there being a sufficient number of research workers who have been trained in accordance with the standards of the past are not good. Indications are that we will suffer a greater shortage of such trained researchers than will any other nation which has carried on research in the past. As a matter of fact we, always, have imported a goodly number of eminent research workers both in pure science and in applied or industrial research. The outlook is that it will not be so easy to import them in the future. Since the late war was largely one of research, a fact rather well demonstrated by the atomic bomb, each nation is likely to endeavor to keep within its territory all its skilled and experienced research workers. It can be expected, therefore, that in the future we will have to train and develop our own researchers rather than to look to other countries for them to the degree it has been our practice to do.

As demobilization takes place we will have an increasing number of men who have had vivid experiences during the past few years, who have had to exercise sound judgment and display common sense to remain alive. We will be extremely short of graduates of colleges and technical schools. It is not possible to predict with any degree of accuracy what percentage of those who had their educations interrupted will go on and complete them. The present outlook, however, is that the percentage is going to be disappointing. A great many young men who have lost three or more years out of their lives, due to the war, are going to feel they cannot afford the time to complete that education they had planned on getting. They are going into businesses of their own, are going to find the best jobs they can get and will send their children to college rather than get college degrees themselves.

Such a situation indicates the only course open is to depend more and more upon those who possess all the other qualifications for research work but lack as complete an education as has seemed essential in the past. Better results, however, may be attained by teaming up these practical individuals with the theoretical ones than might be expected at first thought. Those who have fought the war have gained certain experience and knowledge, have developed judgment and common sense to a degree they could not in any other way. They may not have gained practical experience in any given industry but what they have done has been practical rather than theoretical.

Industrial experience and research resulted in design changes in ordnance which enabled us to arm not only our own fighting forces but also help a great deal in arming our allies as well. Those who suggested the changes which would save labor and material as well as speed up production were not ordnance experts. Rather, they were production experts. They were practical and experienced in speeding up production. What they did, not only went a considerable distance in helping us win the war but also lowered the cost of war production.

Dr. Ricardo, in his address, gave considerable attention to the gulf which he thought existed between the researchers and the production men. If the shortage of trained research workers results in bringing more of those with experience in industry into the laboratories to work with the theorists there may be a real gain. It is not easy for one who spends all his time in a laboratory to continue to have a full understanding of the problems in the shop. Neither is it easy for those who spend all their time in the shop to understand what is going on in the laboratories. Hence, there is a tendency on the part of both to underrate the value of what the other is doing.

The present situation should bring them closer together than ever before if more are taken from the shop and placed in the laboratories. At least, they will bring a new point of view. Their shortage on theory will have to be made up by those who have gained the theoretical point of view. Those strong on theory can gain a more practical viewpoint by associating to a greater degree than ever before with those who are strong on practice. The real objective of industrial research, of course, is to make practical application of the knowledge gained in fundamental research, that is the discovering of new natural laws and extending the range of our knowledge generally, as Dr. Ricardo points out, but with no immediate objective in view. Industrial research has very definite and immediate aims. They are to develop new materials, processes, etc. which will make possible entirely new things or improve the quality and lower the cost of present things.

There is no industry in which there is not a need for such work. Research has played an important part in the electrical industry in making it possible to reduce average domestic rates to about one-eighth of what they were in 1882. Research in the automobile industry has given us better and better cars at lower and lower prices. Research in the telephone industry has given us better service, has extended the distances over which conversations can be conducted and lowered the cost of the service rendered. These three industries have grown and prospered to the degree they have, largely because, from the beginning, so much attention was given to research. The aviation industry is another in which research has brought about revolutionary changes. Speed, cruising range and size of planes have steadily increased.

Prior to 1918, of course, Germany held virtually a monopoly on chemical research including dyes. Since about 1935 research in that nation has been losing ground. Too much bureaucratic control played its part. Losing the war has proved another serious blow to future research there. No longer can we depend on German laboratories for advances to the degree we have in the past. Neither is it likely that Germany is going to produce anything like the number of capable research workers she has in the past. The time has come when, here in the United States, we will have to depend to a greater and greater degree upon research workers who are trained here and until such time as there is an adequate number being trained we will have to do the very best we can with the individuals who are available even though they may lack all the formal education which may seem desirable. In any case, if we are not to begin to lose ground research work must go on.

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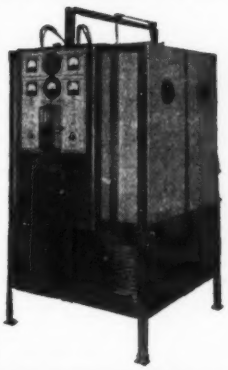

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WANTED: DYE CHEMIST, preferably with experience, for research and development. Medium sized plant, growing organization, excellent chance for future. Send record of training and experience with snapshot. Our employees have been notified. Box 853.

POSITION WANTED: Returning Vet desires chemist position in Metropolitan area with responsible dyehouse or chemical firm. In return will furnish new ideas in dyeing synthetic fabrics. Write Box 854.

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WANTED FOR ARGENTINA: "M'G'R Textile printing with "know how" of ultra-modern methods of Block—(Stencil—Film) preferably also Roller-Printing, etc. Ideal working conditions in most modern progressive and highest rated plants. Unusual opportunity for right man. Contract for 2 years. State complete background (2 resumes) in first letter. Box 863.

POSITION WANTED: As superintendent or assistant in small dyehouse (Metropolitan New York) in charge of quality and purchasing dyestuffs and chemicals. At present in charge of a dyestuff laboratory of a manufacturing company. Textile chemistry background. Total of 18 years in dyeing field as supervisor and dyer, age 40. Box 857.

POSITION WANTED: Married man, 38 years old, 20 years experience in preparing dyeing and finishing of light and heavy rayon and cotton piece goods. Presently employed in executive capacity but desires a change. Would consider a selling opportunity with reliable company. Box 856.

WANTED: DYER; must be thoroughly experienced on jigs and boxes and the handling of acetate and rayon fabrics, including plied yarn fabrics. Kindly state experience, references, age and salary expected. Box 858.

WANTED: Finisher, must be thoroughly experienced on jigs and boxes and the handling of acetate and rayon fabrics, including plied yarn fabrics. Kindly state experience, references, age and salary expected. Box 859.

POSITION WANTED: Textile School graduate in chemistry and dyeing, eight years experience in dye laboratory testing dyes, matching shades, research work, trouble shooting combined with practical work on dyeing of all type yarns. Employed at present, desires to make change. Age 30. Box 860.

POSITION WANTED: Textile chemist's assistant, graduate Durfee Textile School, six months experience. Veteran, wants start. Moderate salary. New York area. Box 861.

WANTED: Man for position of technical representative to demonstrate wool oils, scouring and fulling agents in the New England States. Must have practical mill experience in woolen and worsted plants. Salary and commission. Box 862.

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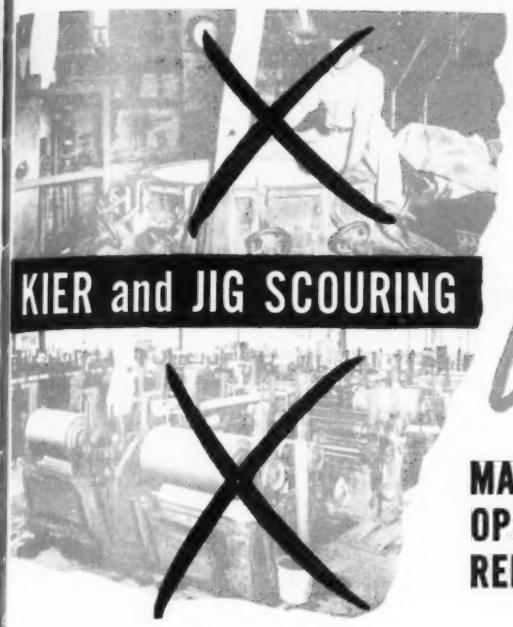

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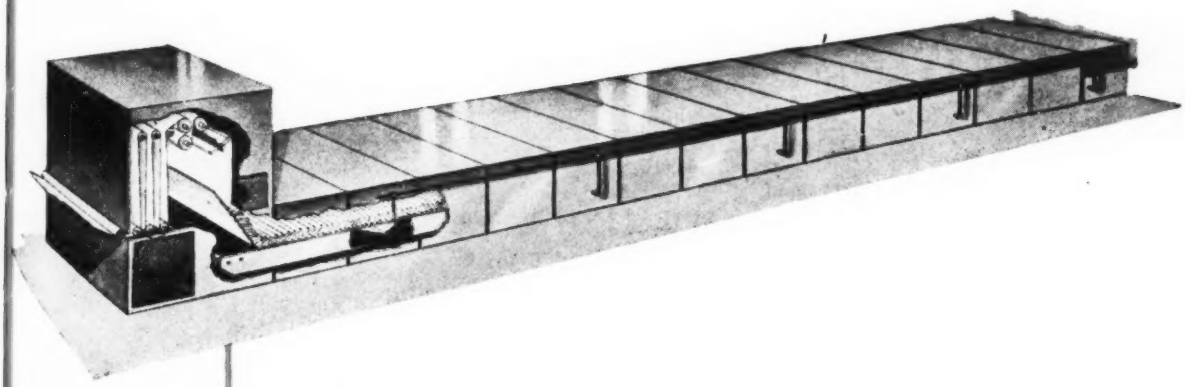

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3. **Prepares cotton and rayon fabrics — in one steaming — for any subsequent treatment such as conventional bleaching or dyeing.**
4. **Handles fabrics of any width, any weight, any yardage.**
5. **Eliminates the danger of rope marks and distortions in the weave.**
6. **Gives greater flexibility and control in the scouring process — may also be used for any of the hot bleaching processes.**

Let the Mathieson technical staff furnish more detailed information on this important development in textile processing.

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